THE MODEL ENGINEER

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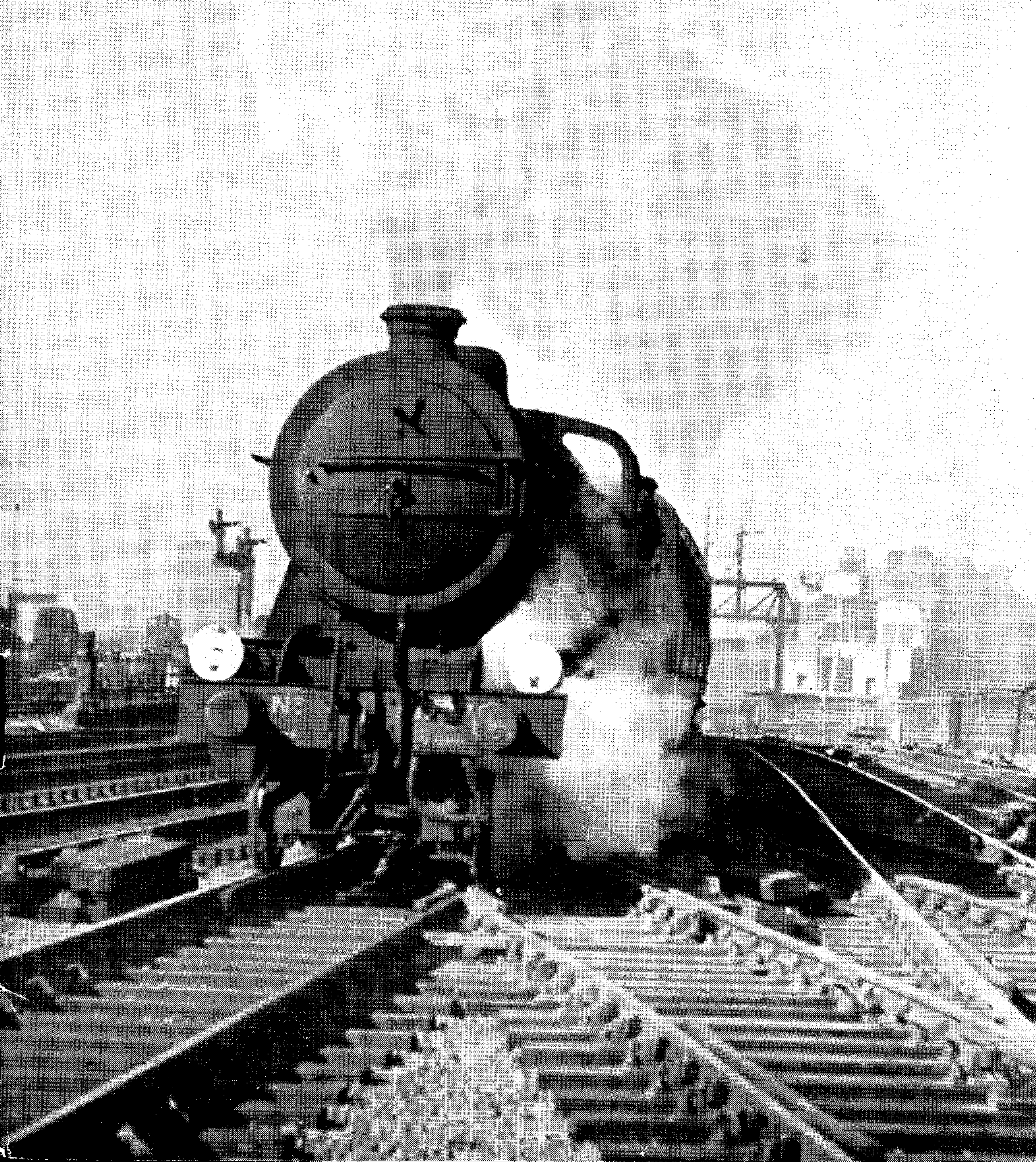


The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

10TH MAY 1951 VOL. 104 NO. 2607

SMOKE RINGS

Our Cover Picture

● THE SCENE so nicely recorded on this week's cover shows a very well-known spot to most railway travellers, but it is from a most unusual viewpoint, except to a few favoured individuals like Mr. R. E. Vincent who photographed it. It is immediately west of Bethnal Green station, at the top of that awkward bank up which all trains out of Liverpool Street have to climb almost as soon as they have started. The engine is No. 1737, a 2-6-0 mixed traffic locomotive of the L.N.E.R. Class K2, and she is hauling a down Norwich and Yarmouth express. These engines were designed by the late Sir Nigel Gresley, and were built between 1913 and 1921, at which time they were the largest 2-6-0's in Britain.

A Tribute from Outside

● OUR CONTEMPORARY, *The New Statesman and Nation*, recently published a well-informed article by Norman MacKenzie, under the somewhat arresting title, "The Wrong End of a Telescope." It began with a very reasoned consideration of the problem as to why men make models. When we come to think of it, a plain and convincing answer to the question is extremely difficult to give without the most careful preliminary thought, and we were intrigued to note Mr. MacKenzie's approach to the subject. He suggests that a part explanation may possibly be found in the experiences of Dean Swift's hero, Gulliver, in Lilliput. "Seen through the wrong end of a telescope," writes Mr. MacKenzie, "the world always seems brighter and more intriguing than life." This, of course, is true, but we must confess that to view our hobby in that light is a new experience and we find it interesting. For, as Mr. MacKenzie is at pains to point out: "Here the human is a giant, his subjects dwarfs, ships and trains the creatures of his own hand: he is part Gulliver, in mastery, and part Walter Mitty, living out his fantasies in miniature. This is certainly true of children and, I suspect, it also holds good for many adults, who are said to form three-quarters of the million who make some kind of modelling their hobby."

There followed a long description of our hobby in its various aspects, a tribute to manufacturers and dealers who cater for us, and an assessment of the importance of the hobby as it affects the community and the export trade.

After mentioning the probable effect of the ban on the use of non-ferrous metals, the article continues: "When this happens, no doubt the enthusiasts will fill the gap by turning their attention to signals, bridges, stations, scenery, and sailing boats, all of which require wood rather than metal. But most of them will not be happy without their locomotives and their steam engines. For one of the odd things about model-making is that the maker often loses his interest in the model once it is finished. He builds his engine more to *build* it, than to operate it. In his own way, after all, he is just as much an aesthete as the potter or the painter."

We enjoyed the article, and were particularly pleased to note the obvious testimony to the indomitable spirit which pervades our hobby.

A Burrell Engine on View

● WE LEARN that at a fair to be held near Barking, Essex, over the coming Whitsun holidays, an 8 n.h.p. light scenic type engine, built by Burrells in 1923, will be on view. She is named *Princess Mary* and is owned by Mr. Charles Presland, of Tilbury, who keeps her in most excellent condition.

If any reader should wish to enjoy a sight of this engine, we can say that the fair will be found next to the "Ship and Shovel" inn, Ripple Road, Barking, which can easily be reached by No. 87 bus from Barking station (District Railway).

Not very often now can a Burrell, or any other make of road locomotive, be found in first-class condition anywhere close to London, and we can well imagine that many readers will wish to take advantage of the opportunity of seeing one by visiting the Barking fair on at least one day during Whitsun.

Operating Mechanical Signals

● WE HAVE lately had some correspondence with Lt.-Col. Hugh Simpson on the subject of operating the signals for his 3½-in. gauge railway. The signals, which are ¼-size copies of old L.N.W.R. signals are manually operated, like their prototypes; but considerable trouble has been experienced owing to the wires over-riding the flanges of the pulleys and becoming jammed, and Col. Simpson appealed to us for advice.

Many years ago, we had similar trouble with signals erected in a garden, and we came to the conclusion that the pulleys, while very desirable from the realism point of view, were more nuisance than, they were worth; so we did away with them and, instead, used flat wooden stakes with holes drilled in them through which the wires were run. This arrangement worked perfectly for straight runs of wire, so long as attention was paid to one or two small points: The wire was ordinary 16-gauge galvanised iron, a 30-ft. hank of which, in those days, cost very little; the holes in the stakes were about ¼ in. diameter, to obviate the effects of friction, as far as possible; the stakes were driven into the ground to such a height that when the wire was taut it tended to press downwards and not upwards in any hole, and the balance-weights at the bases of the signal-posts were heavy enough to ensure not only the proper working of the signal, but also that, no matter whether the signal was "on" or "off," the wire was always in tension.

Where it was necessary for the wires to run round sharp bends, we reverted to the use of pulleys, breaking the wire on each side of a pulley and inserting a length of small chain to effect the bend. With the stakes placed every 10 ft. or so, this system worked perfectly, even with the signals placed 80 yd. or more from the lever-frame.

Another point which had to be watched, however, was that grass, weeds, etc., which tended to grow along the wire-runs had to be kept well under control; otherwise, considerable additional friction was likely to make itself unpleasantly apparent, especially in the case of a long run of wire, and prevented the free working of the signals. At one time, a few bell-cranks were tried instead of pulleys at right-angle bends; but, for some reason, they did not work so well as the pulleys and were not so easy to fix down firmly, so their use was abandoned.

A Model Marine Club Revival

● IT IS pleasant to hear of old clubs being revived. The latest of which we have had news is the old Wirrall Model Yacht Club whose history goes back to the year 1895. In the course of years the interest has changed from yachts to power boats, that is the natural order of things, but yachts have by no means disappeared from the scene. In any case, power boats, in the present sense of the expression, were unknown in 1895. The new name of the club is The Wallasey Model Power Boat and Yacht Club, and a very fine sailing lake with a clubhouse has been provided by the local borough council. Incidentally, the borough council is giving the club its fullest support. There must be many clubs in Lancashire and Cheshire to whom a visit to Wallasey would be a pleasant outing. The club would like to meet other clubs within reasonable distance to arrange races and regattas. With this view in mind, they are holding their first open regatta on Sunday, July 22nd, in the Central Park, Wallasey. In addition to two prizes offered by the club, the local Festival of Britain Committee has promised to give two suitable prizes. The Crosby Model Club has promised its support, as have also one or two lone hands from across the Mersey. The club would welcome further entries from clubs or individuals for Steering, Nomination and Club Relay Events and for Round-the-pole racing with hydroplanes. Visitors and friends from other clubs will be warmly welcomed, and light refreshments will be provided free.

Full particulars can be obtained from the Hon. Secretary, H. A. JACKSON, 21, Deveraux Drive, Wallasey.

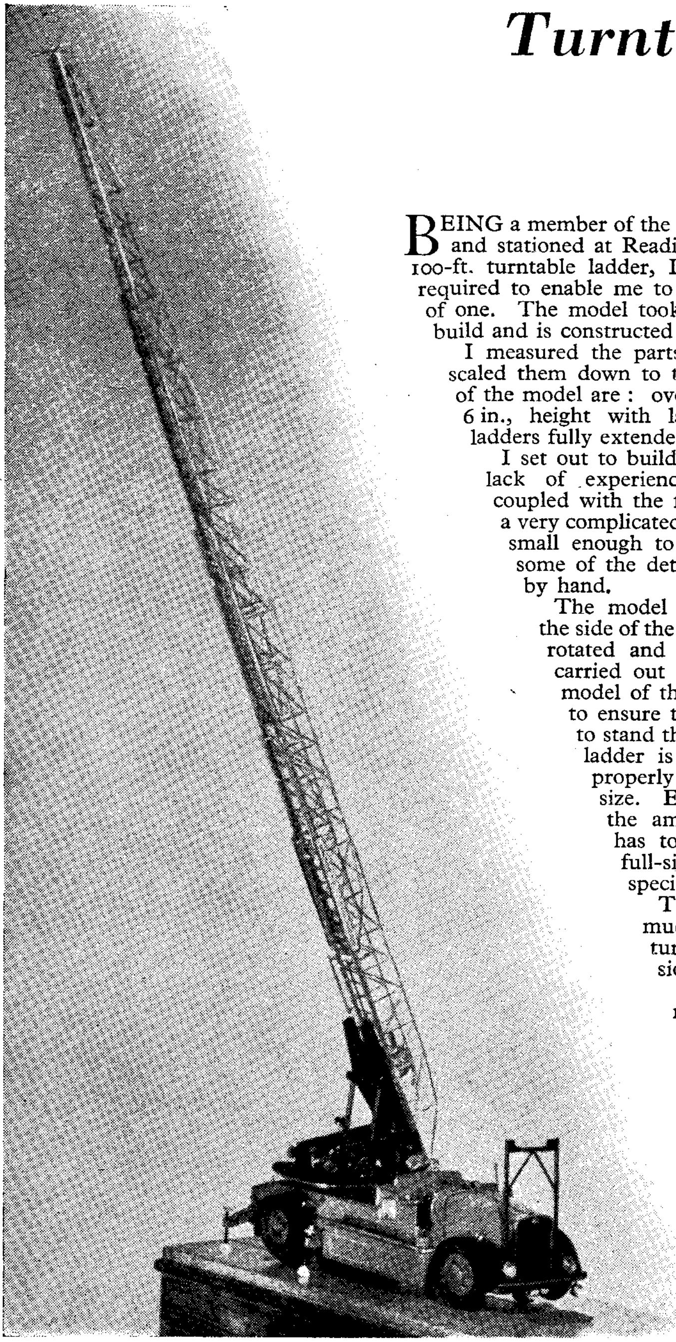
Bombay S.M.E. Report

● WE HAVE been favoured with a copy of the eighth annual report of the Bombay Society of Model Engineers, and from it we learn that, in spite of the ever-prevailing difficulties, good progress has been made. Curiously enough, there is no mention of the number of members; but we note with interest that the society is engaged in active negotiations with a view to obtaining Government recognition. If this scheme is successful, it should have a very far-reaching effect in establishing the model engineering hobby and allied craft in India where the great majority of people, at present, appear to misunderstand it and, consequently, to underestimate its importance.

All the more credit is due, therefore, to the Bombay S.M.E., under the energetic and painstaking guidance and leadership of its chairman, Mr. M. P. Polson, for making such steady progress in what amounts to an uphill struggle, during the past eight years.

A Model Dennis-Merryweather Turntable Ladder

by R. Fenwick



The ladder in operation fully extended and partly rotated

BEING a member of the Berkshire and Reading Fire Brigade and stationed at Reading, where there is a Merryweather 100-ft. turntable ladder, I was able to get all the details I required to enable me to build a ½-in. scale working model of one. The model took eighteen months of spare time to build and is constructed partly of wood and partly of brass.

I measured the parts of the full-size ladder, and then scaled them down to the required size. The dimensions of the model are: overall length 1 ft. 6 in., overall width 6 in., height with ladders housed 7 in., height with ladders fully extended 4 ft. 1 in.

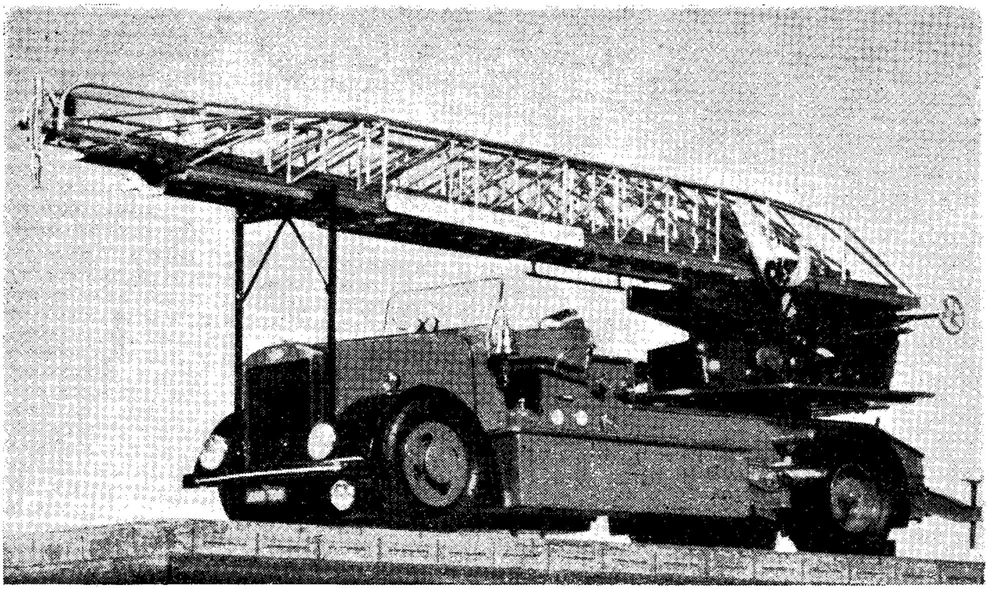
I set out to build an exact replica, but owing to my lack of experience and of workshop equipment, coupled with the fact that the full-size appliance has a very complicated gearbox which I could not produce small enough to keep to the scale, I had to alter some of the details slightly and operate the ladder by hand.

The model is operated by a handle fitted at the side of the base, and can be elevated, extended, rotated and plumbed, these movements being carried out singly or together. In building a model of this kind, great care has to be taken to ensure that all the parts are strong enough to stand the strain imposed on them when the ladder is operated, also that the ladder is properly balanced, otherwise it will capsize. Even so, the angle of elevation and the amount of extension on the ladder has to be watched, as in operating the full-size ladder which, incidentally, is a specialist job.

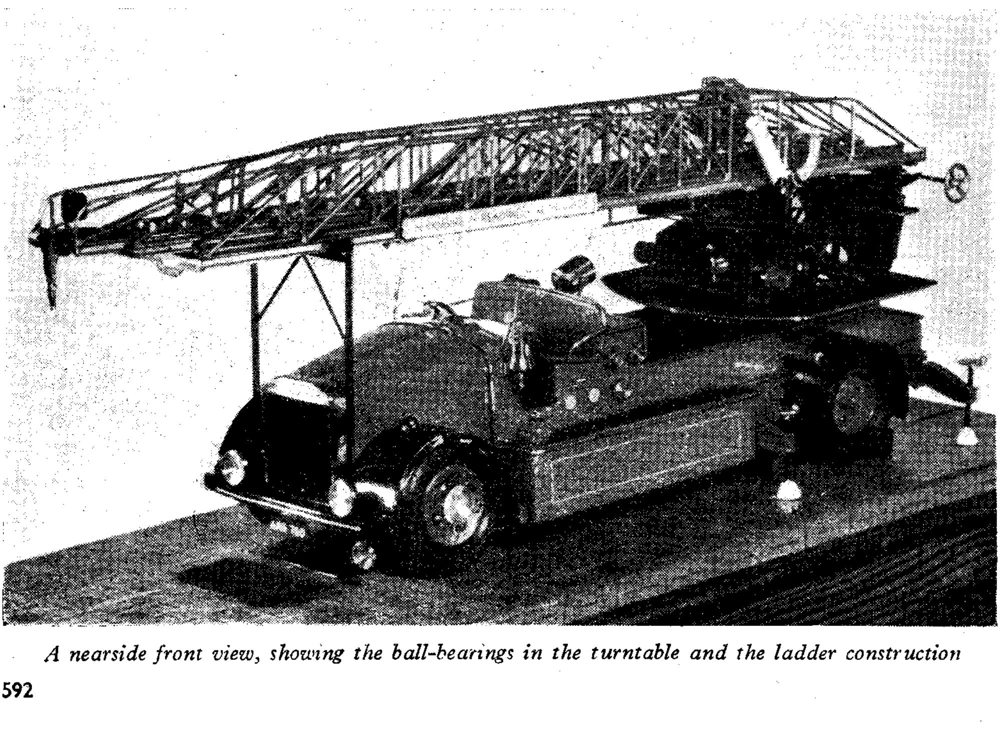
The model is painted red with black mudguards and running boards, green turntable parts, silver ladder extensions and polished brass fittings.

The construction details of the model are as follows:—

The appliance body is made of wood. Meccano pulley wheels altered slightly on the lathe and fitted with Trix rubber tyres form the wheels. Mudgaurds are of sheet brass. Radiator made up from brass curtain-rail and wire. Dummy steering wheel was adapted from an alarm-clock escapement wheel. Instrument panel made up from washers and sheet brass. Ladder gallows made from steel rod. Windscreen frame from brass tube

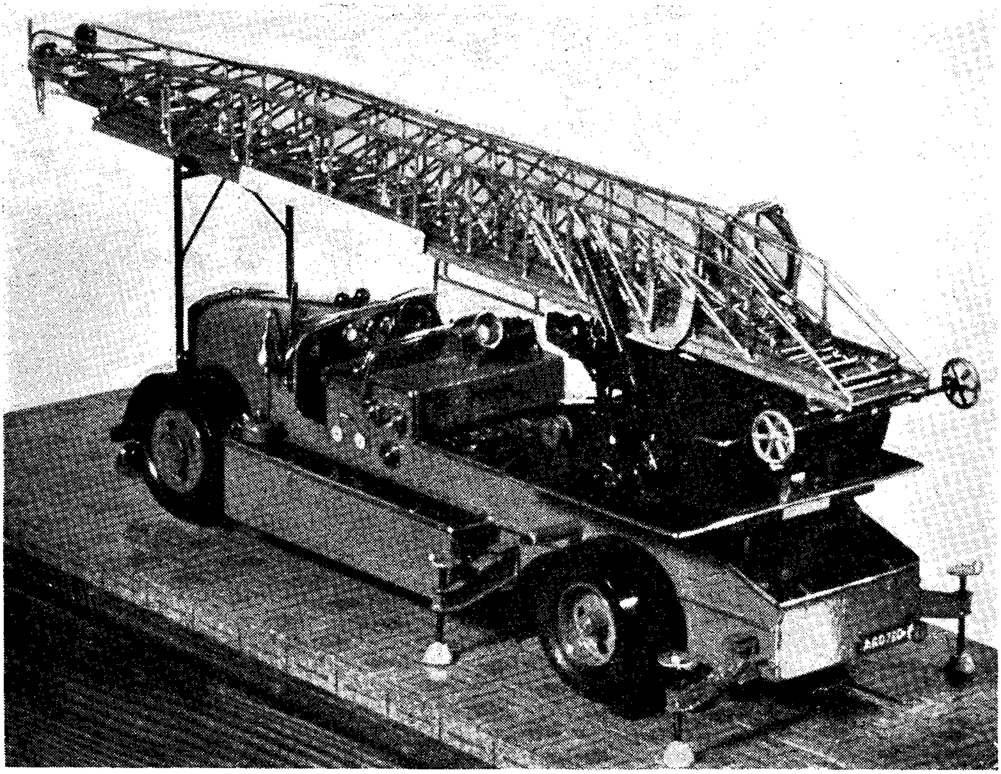


A nearside view, showing the small fittings and operator's controls on turntable



A nearside front view, showing the ball-bearings in the turntable and the ladder construction

made flat and split to hold mica windscreen. Fire bell, amber flashing lights, head and side lights, extinguishers and other small fittings were turned from brass rod. Handrails were made from brass wire ; beading from brass wire filed half-round and fixed to the appliance body by sticking pins in to the wood and soldering the beading to the pins. The searchlight was turned and bored from brass rod and fitted with a pea-bulb connected to a battery, housed in the base of the model. The four jacks were made from screwed rod, ball-bearings soldered to a washer for the handles and the feet turned from brass rod. The turntable platform is made of wood, grooved to give the effect of being covered with a non-slip material and is bolted to a brass ring which, in turn, rests on fifty ball-bearings running in a channel cut in another brass ring which is bolted to the appliance body, so forming a ball-race for the turntable to revolve on. The two brass rings are held together by a hollow bolt. The fulcrum frames are made of sheet brass. The two elevating screws have their bearings which are of brass bolted to the turntable and are connected to a common shaft by bevel gears. The telephone-box, height indicator, plumb-bob and control handles are all made from brass. The swinging frames are made from brass. Handwheels for plumbing gear made up from brass curtain rings. Ladder extensions from " O " gauge railway lines and steel wire. The shape of the railway lines allows the ladders to slide in one another without additional guide-bars. The monitor, telephone cable-drum were turned from brass. Fishing line with a 22-lb. breaking strain forms the extending cables.



A nearside rear view with the ladder ready for operation with jacks down and elevating screw covers removed, and rear wheel blocks in position

The mechanism for operating the ladder is housed in the base and the power is transmitted from the base to the turntable by two hollow shafts running in one another, the extension cable passing through the centre shaft from the winch in the base to the ladder sections. The model is bolted to the base by four angle brackets concealed under the model.

Now I am building a model Merryweather steam fire engine, being inspired by the cover photograph of a recent issue of THE MODEL ENGINEER, and helped by reading articles published in it each week. This model will be my second attempt at scale modelling.

*" That Wonderful Year . . . . . . "

by " The Dominie "

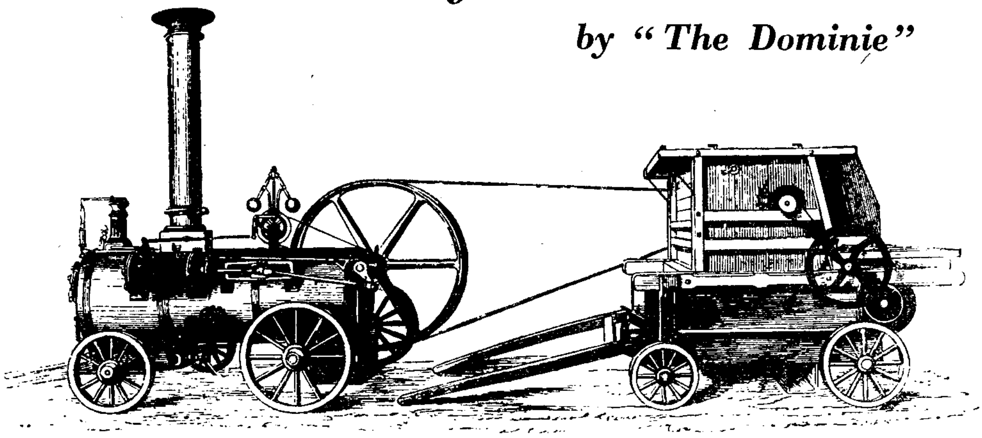


Fig. 9. Garrett's portable steam-engine and threshing machine, as exhibited in 1851 at the Great Exhibition of All Nations

HAVING arrived over at the south side of this immense Crystal Palace, the portable engines should be somewhere around here. Look out for the tall chimneys—ah, yes, there we are. That name looks familar—Garrett & Son, Leiston Works—and no wonder, for under a rather different title it will still be known to us when we return to our own century. Now their portable engine (Figs. 9, 10 and 11), has quite a different appearance from the general run of portables.

In the first place, the firebox is at the steerage end, and the flues pass forward to a smokebox at the other end. From here return-tubes pass back to a second smokebox under the nearly centrally-placed chimney—an arrangement which one would imagine would somewhat curtail the steam space. Secondly, the unlagged cylinder is bolted to the side of the boiler, and the crank-shaft with its heavy-looking flywheel runs in bearings bolted to the smokebox. The valve-chest is above and on the inside of the cylinder, with a steam pipe connected to the top of the boiler. In this pipe is a butterfly throttle-valve, controlled by a Watt-type governor. The water-pump is mounted vertically on a tank below the smokebox, and the spring-balance safety-valve in a rather ornate vase. The catalogue tells us, by the way, that the boiler is lagged with hair and felt under an iron jacket.

**Continued from page 501, " M.E.," April 19, 1951.*

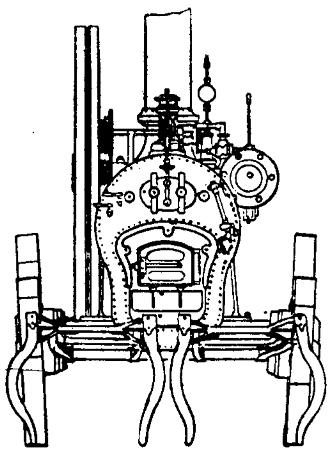


Fig. 10. Firebox end of the Garrett portable engine. Notice that the water-space extends right across under the firebox

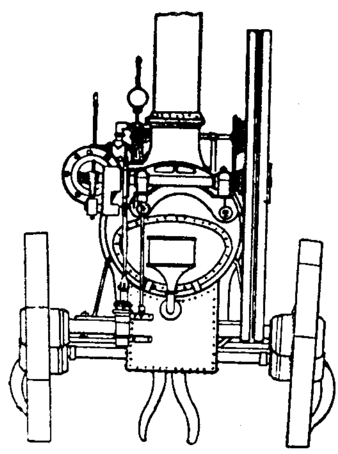


Fig. 11. The crankshaft of the Garrett engine is supported in brackets on the end of the boiler. Note eccentric-driven feed-pump bolted direct to the side of the water-tank

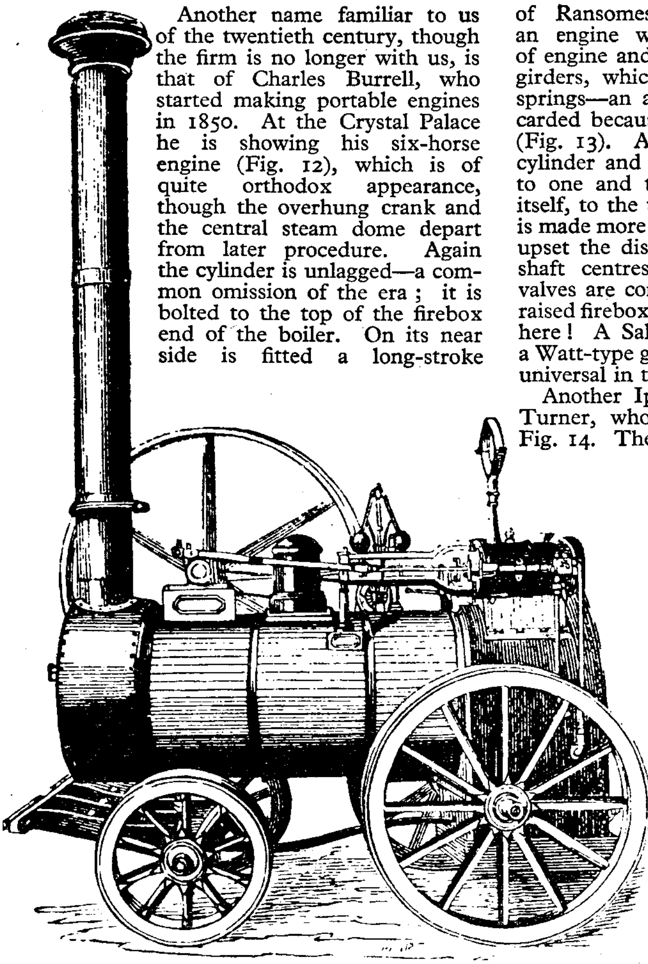


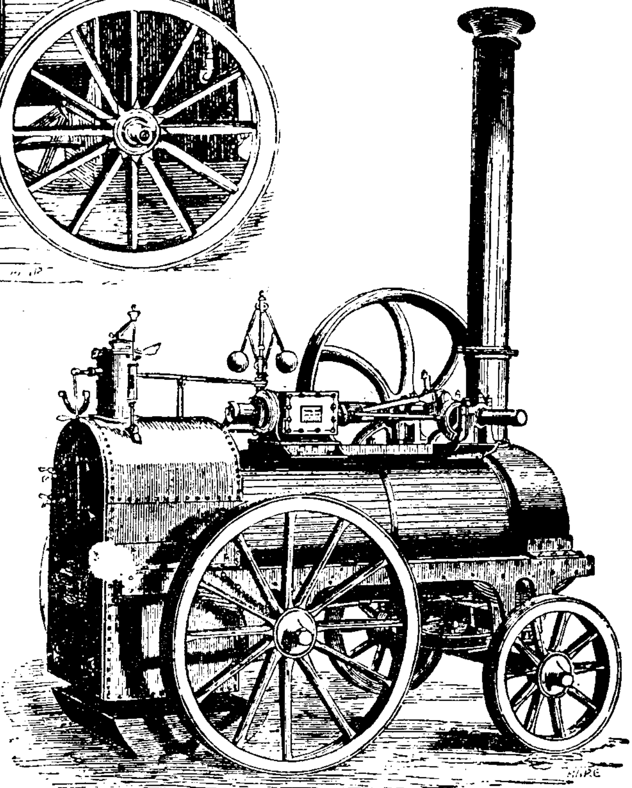
Fig. 12. *The Burrell six-horse portable, with its overhung crank and its steam-dome*

Another name familiar to us of the twentieth century, though the firm is no longer with us, is that of Charles Burrell, who started making portable engines in 1850. At the Crystal Palace he is showing his six-horse engine (Fig. 12), which is of quite orthodox appearance, though the overhung crank and the central steam dome depart from later procedure. Again the cylinder is unlagged—a common omission of the era; it is bolted to the top of the firebox end of the boiler. On its near side is fitted a long-stroke water pump, driven direct from the cross-head, and feeding most unwisely to the side of the firebox. The peculiarly "bent" slide-bars, by the way, are to remain a Burrell feature for several years. The Watt-type governors are so arranged that the speed of the engine can be varied between 90 and 110 r.p.m. without stopping the engine. The boiler, it will be noticed, is neatly lagged with wooden planks, but an awful lot of therms must be dissipated by that unlagged firebox!

On Stand No. 124 we see the four-horse portable engine of Ransomes & May, of Ipswich. Again an engine with a difference, for the weight of engine and boiler is carried on channel-iron girders, which in turn are supported on plate springs—an arrangement which will later be discarded because it introduces undesirable weight (Fig. 13). Another unusual feature is that the cylinder and the crankshaft bearings are bolted to one and the same base, which is attached, itself, to the top of the boiler. Thus the engine is made more rigid, and boiler expansion does not upset the distance between cylinder and crankshaft centres. The regulator and governor-valves are contained in a dome mounted on the raised firebox top, and there should be no priming here! A Salter spring-balance safety-valve and a Watt-type governor are fittings which are nearly universal in this year of grace 1851.

Another Ipswich firm is that of E. R. & F. Turner, whose four-horse portable is seen in Fig. 14. The rather complicated looking gadget

Fig. 13.—*Below. Ransomes' unusual portable, with sprung girder frame and "unit constructed" engine*



at the side of the cylinder is the firm's "patent steam-boiler feeding apparatus," which regulates the water-level through an internal ball-cock similar to our own century's domestic ones. In addition, in case of a deficiency of supply, the apparatus blows that steam whistle sticking out at the top of the boiler front—which you, no doubt, being a mere locomotive fan, will be so uncomprehending as to term the "backhead."

Richard Hornsby & Son, in their six-horse portable (Fig. 15), have hit on an idea which is to play a large part in winning them the first prize in their class at the steam trials of the Great Exhibition of 1851, by making the engine more economical in coal and water than any of its rivals. The idea, to us moderns, is obvious: namely, to lag the cylinder, but Hornsby's have carried it out in an unorthodox way by totally enclosing the cylinder in an upward extension of the steam-space over the firebox—as the catalogue says, it is "protected from the weather" thus. The crankshaft bearings are supported on pretty fluted columns, and an eccentric-driven feed-pump is mounted on the square base of the chimney.

A further example of a portable with an enclosed cylinder

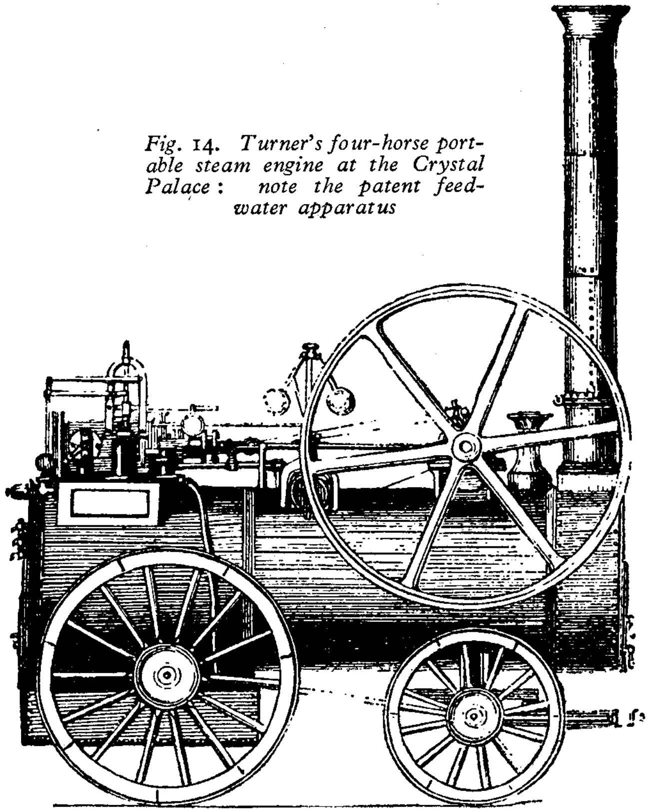


Fig. 14. Turner's four-horse portable steam engine at the Crystal Palace: note the patent feed-water apparatus

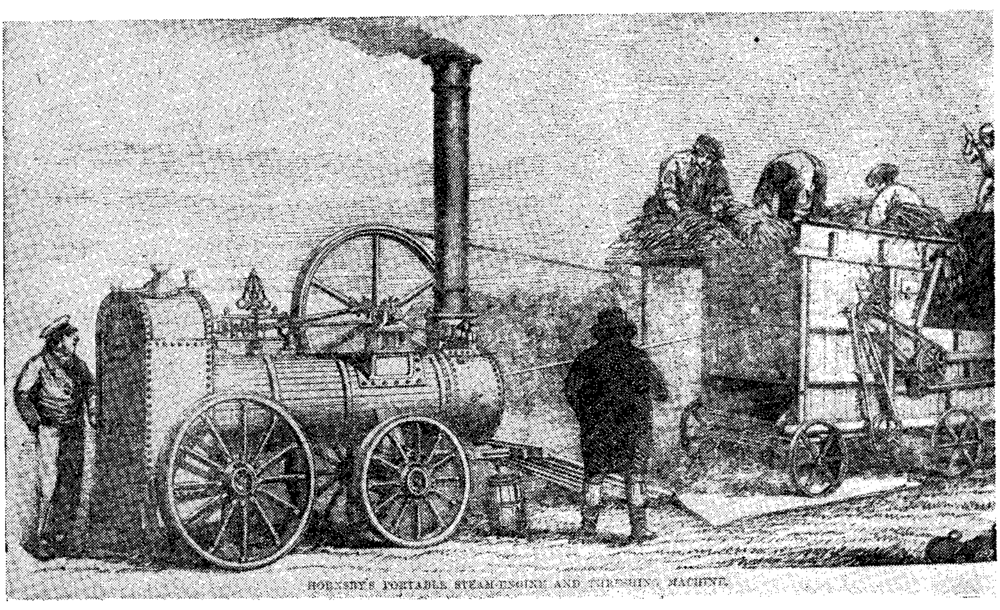


Fig. 15. The portable exhibited by R. Hornsby & Son, with its cylinder buried in the firebox top; which engine won the 1851 steam trials with a coal consumption of 6.73 lb. per h.p. hour

is that of Tuxford & Sons, who are showing both four- and six-horse models. In their design, however, the whole of the working parts are enclosed in a sheet-iron case, not only to protect them from grit, dust, and the weather, but also to "prevent interference by unauthorised persons, being under lock and key." It is interesting to note that no claim is made that the enclosure of the cylinders conserved heat, and presumably the firm have no idea of this, but it is perhaps significant that the Tuxford six-horse engine will come second in the later trials! The cylinders are vertical, under the crankshaft, "the proprietors considering that this is the best position to ensure the cylinders not wearing oval, as in the case of the horizontal cylinder." Like Garrett's, Tuxford's fit a return-flue boiler. From the firebox, two large flues, with a water space between them, lead forward, with 17 lap-welded tubes in two rows taking the gases back to the chimney-base.

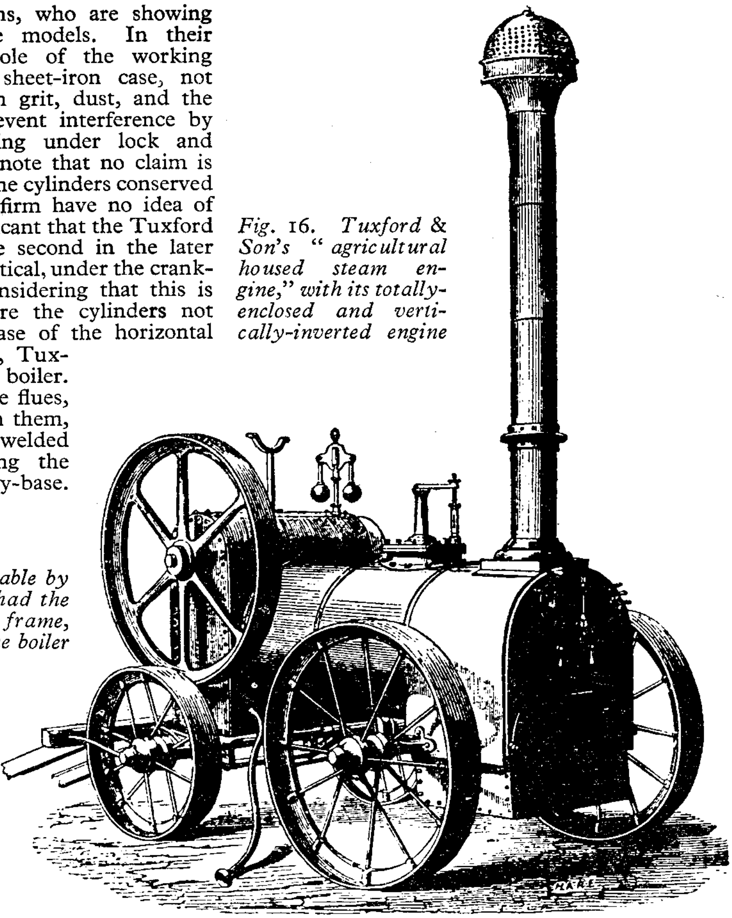
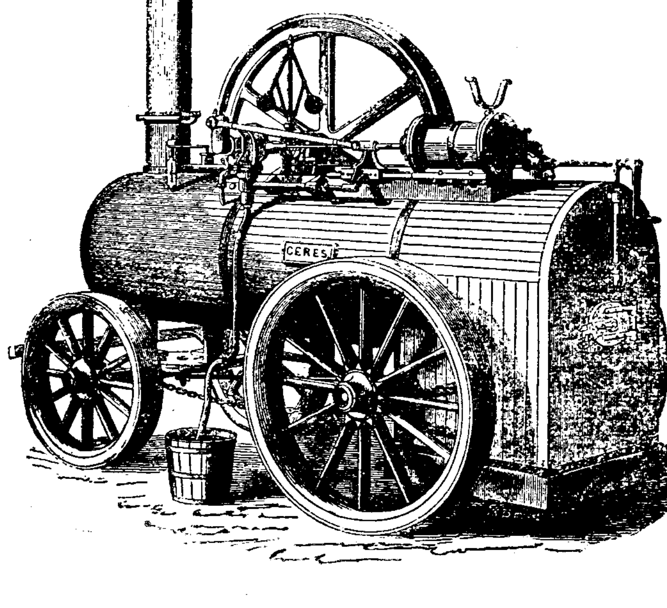


Fig. 16. Tuxford & Son's "agricultural housed steam engine," with its totally-enclosed and vertically-inverted engine

Below—Fig. 17. This portable by Barrett, Exall & Andrews had the engine complete on a metal frame, which was itself bolted to the boiler



Barrett, Exall & Andrews are showing a very handsome machine indeed, bearing the name *Ceres*. The boiler, firebox, and even the smokebox are neatly lagged with wooden planks, but once more the cylinder is naked. The engine itself is mounted complete on a metal frame, which is independently removable from the boiler. An overhung crank is used, and the pump, mounted on the engine-frame, is direct driven from the cross-head; the Watt governor and Salter safety-valve complete the picture.

Continuing our adventure into the past, we jostle through the crowds, many of whom in this section are evidently "up from t'

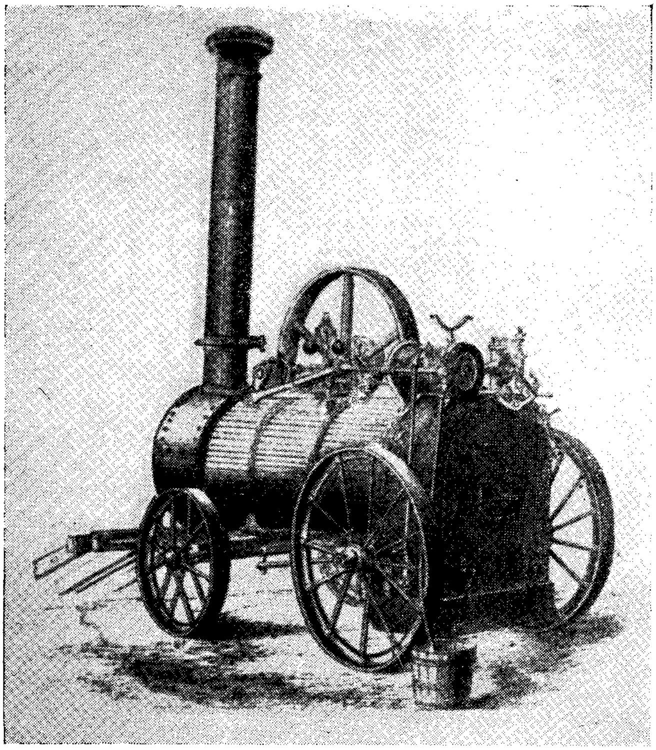


Fig. 18. *Clayton & Shuttleworth's portable was one of the very few with metal wheels*

country," thanks in part to the cheap trips run by the various railway companies. And so to Stand No. 242, where Clayton, Shuttleworth & Co., of Lincoln, have their six-horse portable engine. This firm made three portable engines only in 1846, and eight in 1847. Then, realising that there was a very great future in steam, they disposed of the iron foundry side of the business in order to concentrate on portable engines and threshing machines—a policy which was to pay handsomely, for the number of steam engines (including, later on, stationary and traction types) produced by this firm reached well into six figures. In the year 1851 the tempo of production has increased to the final total of 126 portables. More to the point still, the coal consumption has gone down in the past two years from 11.8 to 8.63 lb. per h.p. hour; in 1853, with the introduction of a steam-jacketted cylinder fixed internally in an upward extension of the smokebox, it will fall drastically again to 4.32!

But at the Crystal Palace, the Clayton & Shuttleworth portable is pretty well of the orthodox design, with its overhung crank, its unlagged cylinder and firebox, its Watt governor and Salter safety-valve, and its cross-head-driven pump.

Now, before we leave this part of the vast building, there are two people I'd like to look up, namely, Usher and Fowler. The first has a model of his "patent locomotive steam-plough" which I believe to be the *same* model we shall see 99 years hence at the 1950 "M.E." Exhibition (Fig. 19). Here it is, and certainly it looks very similar (Fig. 20). But Mr. Shackle's model has a screw arrangement to raise and lower the frame carrying the rotary ploughs, whereas this model has a rack and pinion operated by a windlass. Since the latter arrangement does not give a *positive* position to the frame, this would undoubtedly be one of the improvements which the inventor made before trying out the full-sized machine in 1852—when it proved very successful incidentally.

As to John Fowler, Junior, of Bristol, his mole-draining plough (Fig. 21) had already been tried and proved. (My chief interest, as a model engineer of 1951, is in the fact that this invention was to lead Fowler to apply his great intellect to the application of steam power to agriculture, and so to lead further to the great firm of Leeds with their magnificent traction engines, ploughing engines and road locomotives.)

But the original mole-drainer was hauled by a wire rope coiled on a horse-turned capstan, and could lay up to 225 yards of drain-pipes to a

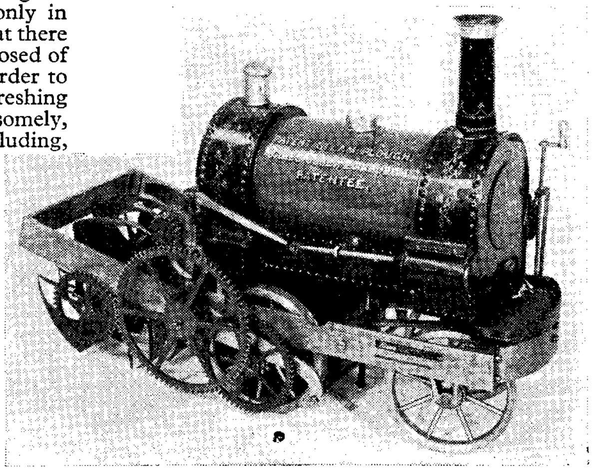
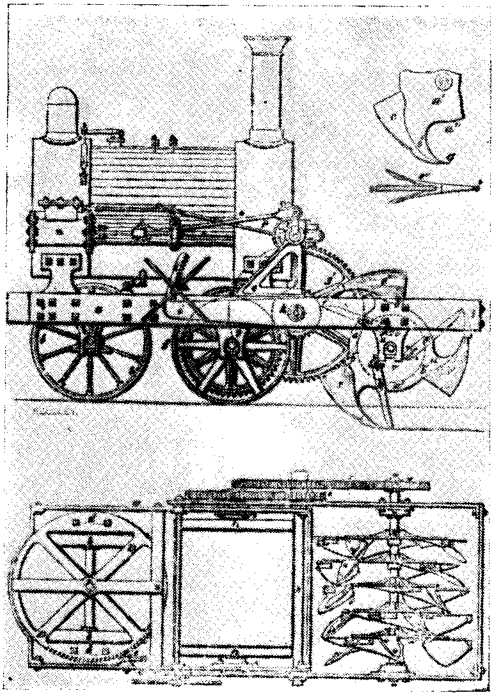


Fig. 19. *A model of the Usher steam plough of* 1851 (*now owned by Mr. C. E. Shackle*) *which was exhibited at the* 1950 *"M.E." Exhibition. The author considers it extremely likely that this is the original model which was shown at the Crystal Palace in* 1851



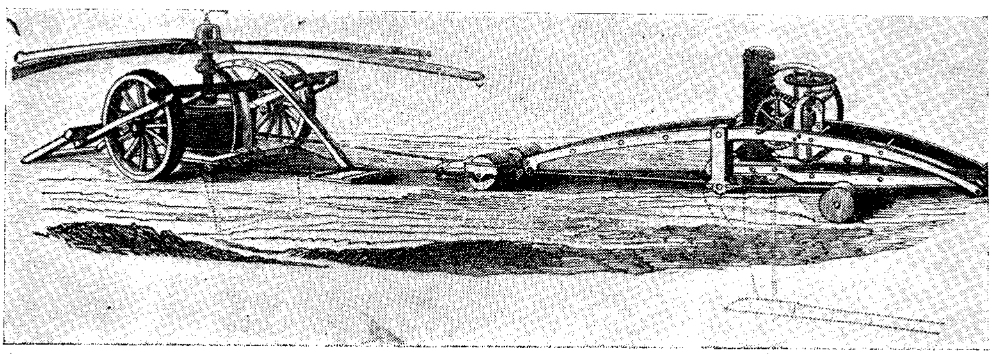
depth of 4 ft. in one operation. Briefly, the pointed "mole" or "plug," attached to the bottom of a stiff blade or coulter which could be raised or lowered in the plough-carriage, was dropped into a hole dug at one end of the field, the windlass being anchored at the other end. Drain-pipes were threaded on a rope attached to the tail of the mole, and as the latter forced a passage through the soil, so the pipes were automatically laid in the passage behind it. Arriving at the windlass, the plough ran into another dug hole; the pipe-carrying rope was unhooked and withdrawn, leaving a perfectly laid drain the full length of the field. The cost of draining a field was cut by half, and the drains were better laid than by hand.

Well, now, if we are going to see something of the stationary and marine engines, as well as other marine exhibits, before our Time Machine whisks us back into 1951, I'm afraid we shall have to get a move on. Off we go, then, back to the north side.

(To be continued)

Left—Fig. 20. A contemporary engraving of Usher's steam plough, in which, however, the driving arrangements are reversed from those in the model

Below—Fig. 21. This engraving of Fowler's "mole-draining plough" should be studied in conjunction with the text



For the Bookshelf

The Metropolitan Railway, by C. Baker. (The Oakwood Press, South Godstone, Surrey.) 76 pages, size 5 in. by 7¼ in. Price 7s. 6d. with paper wrapper, 9s. cloth bound.

The history of the Metropolitan Railway, from its inception in 1853 until it was absorbed into the plan organised by the London Passenger Transport Board in 1933, is a very fascinating one, and Mr. Baker has set it down well in this little volume. Probably few people today realise that the original scheme provided a railway 3½ miles long, planned to run below the level of the public highways, from Paddington to Farringdon Street. How this line eventually grew, extending out into the countryside from Baker Street, a station about one-third of the way along the original line eastwards from Paddington, to Brill, in Oxfordshire, is fascinatingly revealed by Mr. Baker. The development of locomotives, rolling-stock and equipment, from the early steam days, is briefly traced, and the text is supported by about forty illustrations in line and halftone.

TEST REPORTS

Some expert comments upon items submitted by the trade

The Target Milling Attachment for the Lathe

THE Target milling attachment has been designed to provide a simple means of carrying out in the lathe many machining operations that would normally be done in a milling machine. It is produced by the Target Manufacturing Co., Wollaston, nr. Wellingborough.

As shown in Fig. 1, the attachment consists of a well-ribbed casting *A*, fitted at one end with bronze bushes to carry the driving shaft *B* and the milling spindle or arbor *C*; these two shafts are geared together by two cast-iron gears *D* and *E*. The 50-T. and 35-T. gear wheels can be transposed so that, quite apart from any variation of the lathe mandrel speed, a change of spindle speed is provided by the device itself.

At the opposite end of the casting are housed the coned spindle *F* for supporting the cutter arbor, and the split bush *G* used to clamp the attachment to the lathe tailstock barrel.

The welded-steel cover that protects the gearing somewhat restricts the length of the driving shaft where it is gripped in the chuck. From the brochure supplied with the attachment, it would seem that the makers intend that the driving shaft should be gripped in a self-centring chuck; however, this method of mounting can hardly be relied on to give accurate centring. Moreover, any eccentricity in the running of the drive shaft will cause the attachment to move up and down as the lathe mandrel rotates, and this movement will, in part, be transmitted to the cutter itself. It is, perhaps, better, therefore, to set the drive shaft to run truly in the four-jaw chuck with the aid of a dial test indicator.

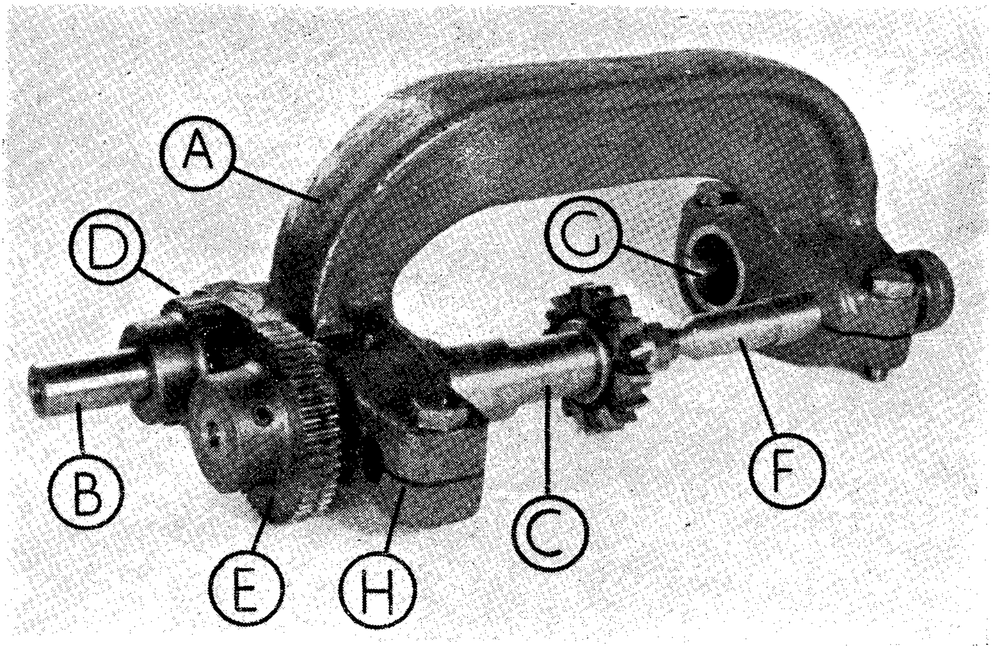


Fig. 1. The Target attachment. "A"—the frame casting; "B"—the driving shaft; "C"—the cutter arbor; "D" and "E"—the gear wheels; "F"—the coned support spindle; "G"—the tailstock bush; "H"—the thrust-rod clamp

Furthermore, as the makers have designed the attachment to be clamped to the tailstock barrel, it is essential that the driving shaft of the device should be accurately located to bring the tailstock clamp-bush exactly in line with the lathe tailstock. The blank piece of material supplied for making this bush should be machined by accurately centring it in the four-jaw chuck and then forming the bore to a close fit on the tailstock barrel.

Although the weight of the attachment is, in part, borne by an adjustable foot-piece, any upward thrust caused by the cutter, as when climb-milling, is resisted by the barrel of the lathe tailstock. This foot-piece or thrust-rod consists of a threaded shaft carrying a ball-jointed foot that rests on the lathe bed or on an extension-piece bolted to the bed. The thrust-rod not only checks any tendency for the cutter to dig into

The gear wheels are secured to their shafts by means of Allen screws; it would, however, be better to arrange for the drive to be taken on a Woodruff key and the set-screws employed solely for end-location. Some shake was present in the bearing of the driving shaft, and the bush itself was slightly tapered internally, measuring 0.626 in. at one end and 0.6275 in. at the other. As the shaft measured 0.6245 in. in diameter,

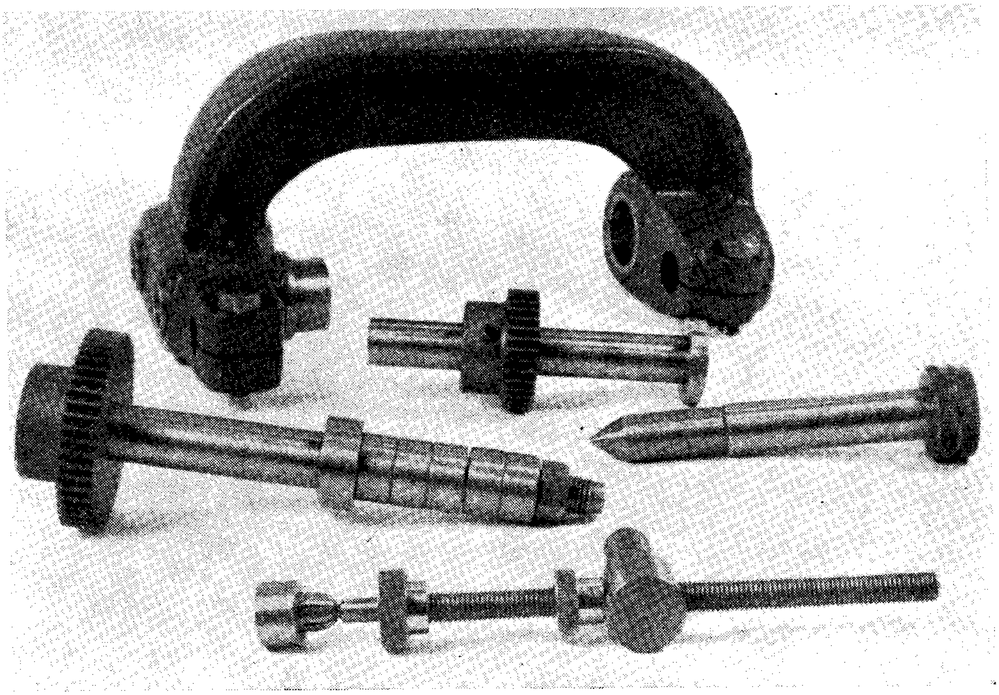


Fig. 2. The attachment dismantled

the work, but it also enables the cutter to be set to the work and the depth of cut adjusted. When setting the cutter, the main casting or frame is unclamped from the tailstock barrel and again secured after the adjustment has been made.

The general finish of the appliance submitted was found to be satisfactory, but some minor constructional defects were noted.

The bushes carrying the drive shaft and the milling spindle abut against unmachined surfaces on the casting, and, although the actual length of these bushes should be sufficient to maintain them in alignment, the resulting appearance is somewhat unsightly.

The rather roughly machined cone at the end of the support shaft should, preferably, be polished to save wear of the female centre in the milling spindle. The milling spindle or cutter arbor was found to be 0.0015 in. undersize, so that a standard milling cutter, having a bore of exactly ½ in., was not readily centred. However, the manufacturers state that the spindle is supposed to be only half a thousandth of an inch under the nominal diameter.

there was a clearance of 0.003 in. at one end of the bearing.

The fit of the milling spindle in its bush was within ordinary commercial limits, for the clearance did not exceed 0.001 in.

Now that the general constructional details of the attachment have been briefly dealt with, some tests will be described for determining the accuracy of the device when set up on the lathe for milling. In the first place, however, the lathe itself should be of known accuracy and must have the tailstock truly aligned with the headstock. When the attachment has been secured in place, the true-running of the cutter spindle is tested by the dial indicator, either attached to the saddle or with its base resting on the lathe bed; turning the spindle by hand did not then give any deflection of the indicator needle.

Next, the alignment of the supporting spindle with the cutter spindle was checked; this was done by engaging the coned centre while the test indicator was applied first at the side of the cutter spindle and then on top, but as neither of these tests caused any alteration of the indicator reading

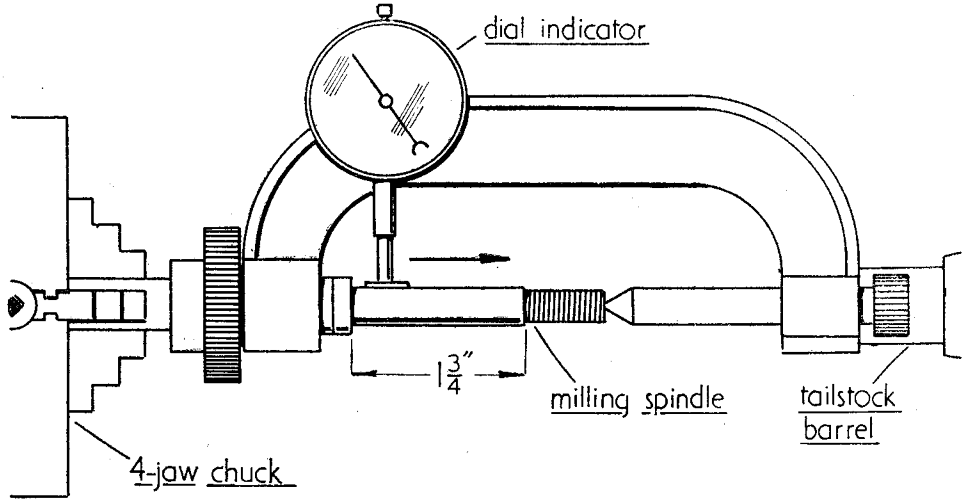


Fig. 3. *Testing the milling spindle for parallelism with the lathe bed*

as the centre was pressed into engagement, and at the same time rotated, it was clearly shown that there was no error of alignment between the parts.

Should there be any lack of parallelism of the contact faces of the distance collars, used on the arbor for positioning the cutter, the arbor itself will be bent, and the cutter caused to wobble, when the arbor clamping-nut is tightened. All the collars were, therefore, measured with the micrometer and were found to be of equal thickness at all points.

The true-running of the cutter when mounted on the arbor is of paramount importance, for any eccentricity, here, will mean that the actual cutting is shared unequally by the cutter teeth.

Of rather less importance in ordinary practice is the exact parallelism between the cutter arbor and the lathe axis ; any error in this respect will, however, result in the cutter not standing truly vertical to the work surface or not lying exactly square across the work. Nevertheless, any such lack of parallelism is undesirable when cutting gear teeth or doing other accurate work.

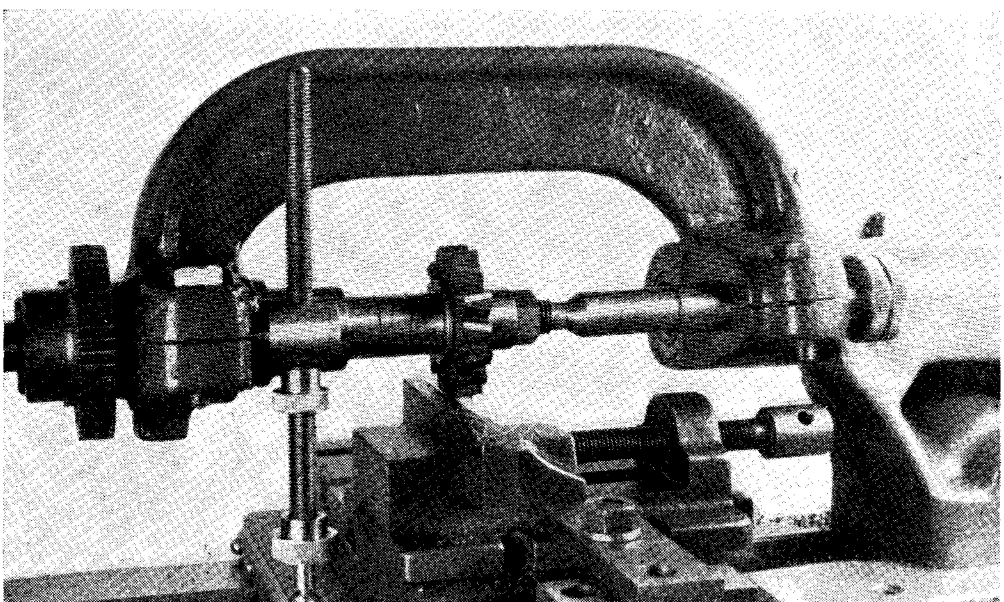


***Fig.* 4** *Milling a tenon with a side and face cutter*

When setting up the appliance in the lathe by gripping the driving shaft in the chuck, it was found that the tailstock bush was then out of alignment with the tailstock barrel by eight thousandths of an inch ; however, the play in the driving shaft bearing was sufficient to allow the parts to engage.

The diameter of the cutter spindle at either end was next measured with the micrometer and the shaft was found to be exactly parallel.

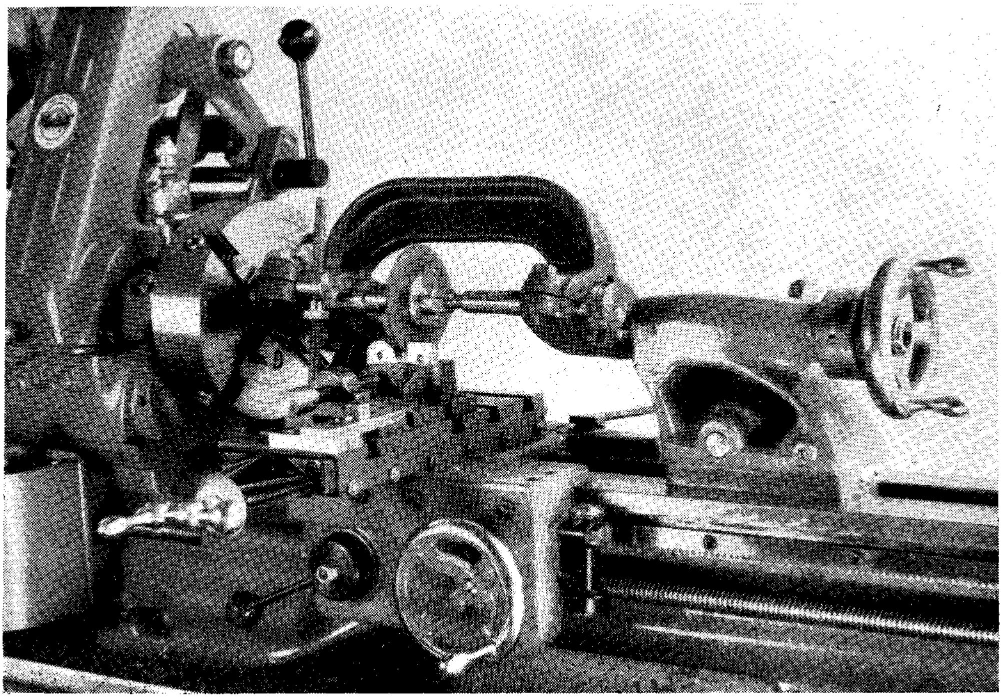


Fig. 5. Machining a slot with a milling saw

It is now possible, as represented in Fig. 3, to take readings with the test indicator to ascertain whether the cutter spindle lies parallel with the lathe bed. When doing this, it is advisable to fit a flat-faced contact to the spindle of the indicator, and the instrument is either attached to the saddle or its base rests on the lathe bed. Readings taken in this way along the upper surface of the cutter spindle at two points $1\frac{3}{4}$ in. apart showed an error of parallelism amounting to 0.0015 in. These measurements were then repeated on the side of the spindle facing the operator. If the test indicator is used resting on the lathe bed, the register-pegs in the base are pushed out so as to align the instrument against the vertical face of the bed shere. The readings then taken showed a lack of parallelism of 0.0025 in. in $1\frac{3}{4}$ in.

The small errors recorded in these two sets of readings are of little practical importance for all ordinary machining, but they would have to be taken into account where really accurate work is concerned.

Practical Tests

In order to assess the machining capabilities of the attachment, a length of $\frac{3}{8}$ in. $\times$ $\frac{3}{4}$ in. mild-steel bar was gripped in a machine vice bolted to the cross-slide of a Myford M.L.7 lathe, as illustrated in Fig. 4. When a side and face milling cutter, $1\frac{3}{4}$ in. in diameter, was mounted on the arbor and trial cuts were taken, it was found that, with the cutter running at 70 r.p.m., cuts $\frac{1}{16}$ in. wide and $\frac{1}{16}$ in. deep could easily be taken ; moreover, a cut 0.010 in. deep and $\frac{5}{16}$ in. wide gave an excellent finish to the work and there was no evidence of chatter. The depth of cut is readily set by applying the dial test indicator to the milling spindle.

It was found, however, that, during these milling operations, the knurled nut locking the thrust-rod tended to loosen. This was apparently due to the fact that this lock-nut seated on the curved surface of the stud carrying the thrust-rod, for, when a flat seating was machined for the nut to bear on, the trouble ceased.

The attachment was next used to machine the mild-steel part seen in Fig. 5. A milling saw, 3 in. in diameter and $\frac{1}{8}$ in. wide, mounted on the arbor and run at 70 r.p.m., was found to cut freely and without any tendency to chatter ; moreover, a very good finish was given to the work.

As a milling device of this kind is well-adapted for cutting long keyways in machine spindles, a practical test was made of machining a keyway

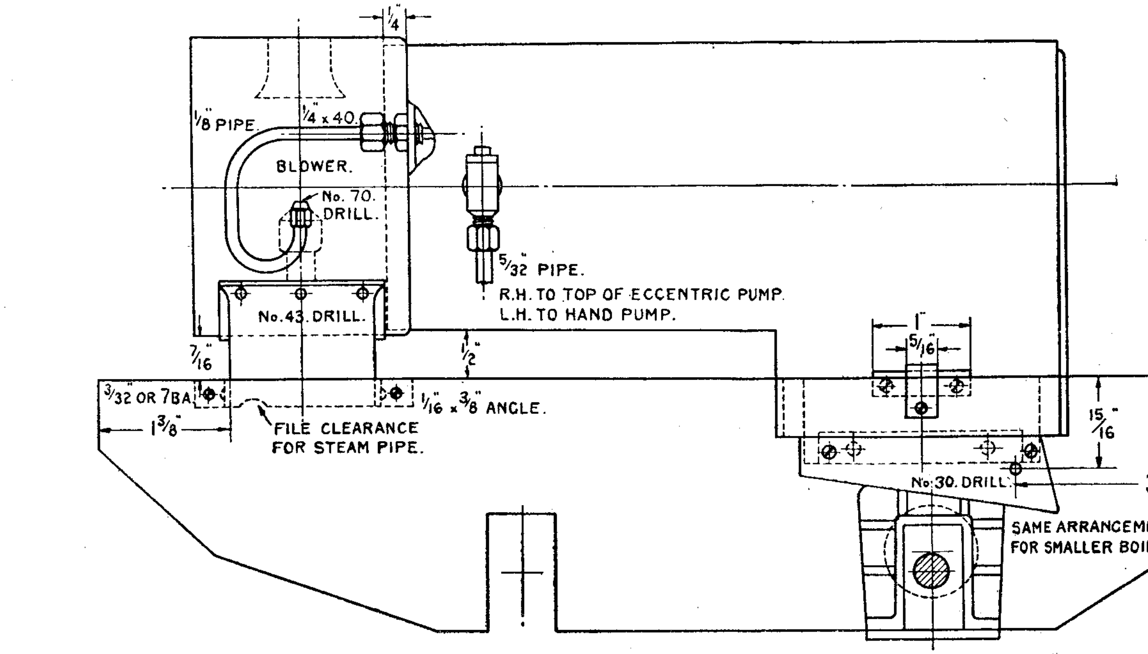
(*Continued on page* 608)

"L.B.S.C.'s" Begin

How to Erect the Large

ALTHOUGH there isn't such a wonderful lot of difference between the actual erection of the bigger boiler, and the smaller edition, there are a few points which will need watching; so, to prevent any of our tyro friends falling into error, I will briefly run over the process. The grate and ashpan will, of course, have to be a little wider, to suit the wider firebox. The grate was illustrated, along with the smaller one, in the last instalment of this serial, and the construction is exactly the same, the only actual difference being that the larger grate has one extra bar; so it won't be necessary to dilate any further on that subject. The wider ashpan is shown, laid flat, in the accompanying illustration, and is very similar to the smaller one previously described. Mark the outline on a piece of 18- or 20-gauge soft blue steel sheet; cut to shape, then bend on the dotted lines as indicated. Its personal appearance should then be very much the same as shown in the perspective sketch in the last instalment. It should fit closely over the projecting part of the firebox below the foundation ring. The side view of the ashpan is exactly the same as shown in the illustration of the smaller one, and three similar holes are drilled in it at each side.

The attachment is also the same as the smaller one. Turn up the two special screws, as shown, from $\frac{3}{16}$ in. round steel rod; drill and tap the two end firebars to take them, then put the ashpan in place, drill the clearing holes through the projecting part of the firebox sides, and erect as shown. The screws should be an easy running fit in the ashpan and firebox plates, but the threads should be tight, so that they don't come slack on the road. The back end of the ashpan is held up by two ordinary 3/32-in. or 7-B.A. screws running through the clearing holes in the ashpan, into tapped holes in the firebox plate. When the whole bag of tricks is erected, the firebars should drop down on the back part of the ashpan, and be quite free to move up and down. This is one of the places where slack fitting is desirable; unless the screws are quite free, they will soon expand and seize up, due to the heat of the fire, and the grate will become a fixture.



How to erect the larger boiler

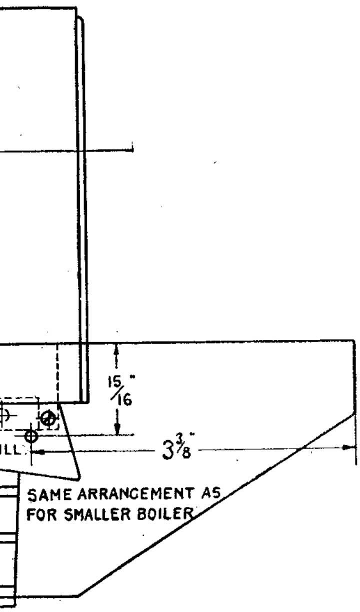
Erection of Smokebox Saddle

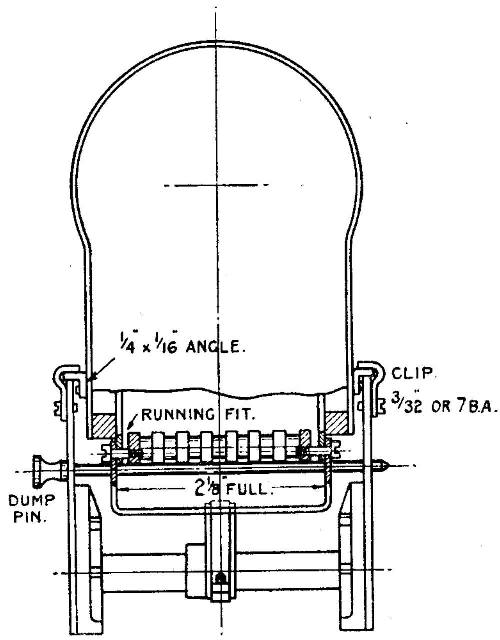
No. 1 variation in the larger boiler job, is that the smokebox saddle is separate, so that merchant must be erected before the boiler and smokebox can be dropped into position on the chassis. There is a clearance between the steam chests and frames, which would enable small screws to be put through holes in the frame, direct into the sides of the saddle, but it would be a rather awkward job. Ease and accessibility being our

Beginners' Corner

e Larger "Tich" Boiler

watchwords (eh ? Oh, no—you'll find watch*works* in gauge "O" !) the simplest way of making the screws easily get-at-able, is to set them far enough apart, to miss the ends of the steamchests. The drawing shows how this can be done. Either cut four $\frac{5}{16}$ in. lengths of commercial angle, of $\frac{1}{16}$ in. × $\frac{3}{8}$ in. section, or bend them up from a





How to fit grate and ashpan

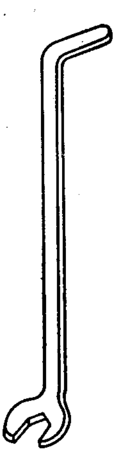
piece of 16-gauge metal $\frac{5}{16}$ in. wide ; a job easily done in the bench vice. Rivet one at each corner of the smokebox saddle, level with the bottom, and flush with the sides, so that they project "fore and aft." These angles are shown by dotted lines in the illustration. Hold each in place with a toolmaker's cramp, drill a couple of No. 51 holes through angle and saddle, and put $\frac{1}{16}$-in. rivets in, brass or charcoal iron for preference. They remain tight much longer than copper.

Next, at 5/32 in. from the top of frame, at each side, drill a No. 41 hole at a full $1\frac{1}{8}$ in. from front end of frame. Level with it, and a bare 2 in. farther along, drill another at each side of frame. Then put the saddle in place (don't forget to clean off any burring around the drill holes) and set it so that the leading end is just $1\frac{3}{8}$ in. from the front end of frames, and the bottom of the radius in which the smokebox rests, is $\frac{7}{16}$ in. above the tops of frames. Run the 41 drill in the holes, make countersinks on the angles, follow with No. 48, tap 3/32 in. or 7 B.A., and put screws in to suit. Any kind of head will do ; the running-boards hide them, anyway, which is consolation to those good folk who are scared stiff of Inspector Meticulous ! If the threads are at all slack in the angles, put locknuts on the screws inside frames.

How to Set the Boiler in Position

If you haven't already drilled the holes in the bottom of the smokebox, for the steam and exhaust pipes, do it now ; they were indicated in the separate illustration of the smokebox which appeared some time ago. Take off the blastpipe nozzle. Smear a small amount of plumbers' jointing—if you haven't any, red lead and gold size, or boiled oil, mixed to a paste, will do—around the back edge of the inside of the smokebox, and push the end of the boiler barrel $\frac{1}{4}$ in. into it. Take care you don't get it lopsided ; when the chimney is vertical, the sides of the firebox should be ditto, and when you look at the chimney from the front end, there should be an equal portion of dome visible at each side of it. Lay a piece of $\frac{1}{2}$-in. rod, square for preference, across the frames at about $3\frac{3}{4}$ in. behind the saddle. Then carefully drop the boiler and smokebox into place. The blastpipe and steam pipe, going through the holes in the smokebox, locate

the boiler longitudinally (two more words like that, and my *Swan* will need refilling !) the saddle settles the height of the smokebox, and the bit of rod ensures that the boiler barrel is the correct height above the tops of the frames. *Could* anything be easier—I ask you !



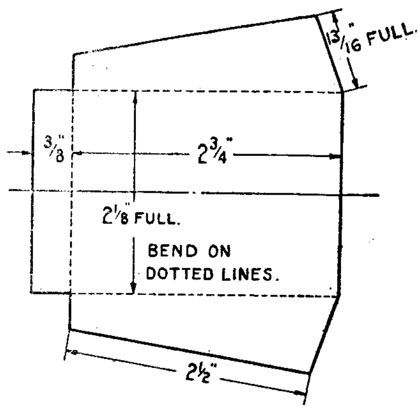
A spanner for awkward corners

How to Fix the Boiler

Run your scriber along each side of the firebox wrapper, pressing it on the top edges of frames for a guide. Then lift the boiler off again. Cut two 1 in. lengths of $\frac{1}{4}$ in. $\times$ $\frac{1}{16}$ in. angle, or bend up the angles from $\frac{1}{16}$ in. sheet, and drill No. 41 holes in each, about 5/32 in. from the end. Now watch your step here, as a slip is easily made. When erecting the smaller boiler, we used a distance-piece at each side, and a piece of angle, resting on it, for an expansion bracket. This boiler has a wider firebox wrapper, only $\frac{3}{16}$ in. narrower than the distance between frames ; and instead of using separate distance-pieces, all we need do, is to turn the angles upside down, and let them serve the purpose, with slightly projecting screwheads to make up the odd 1/32 in. each side. It is in the attachment of the angles, that a slip might be made, as it is the *inside* edge of the angle that needs to be set to the scribed line along the wrapper. The best way of making certain that a beginner gets it right, would be to scribe a line a little over 1 in. long, at a carefully-measured $\frac{1}{16}$ in. above the line already scribed across the side of the wrapper sheets. Set the piece of angle right in the middle of the wrapper sheet, midway between throatplate and backhead, with the outer edge level with the short scribed line mentioned above. Tack it with a blob of solder, if you like, which is simple and does the trick, but it needs a good hot soldering bit. Slightly countersink the holes in the angle ; run the No. 41 drill in, make countersinks on the wrapper, follow it with No. 48, tap 3/32 in. or 7 B.A., and put countersunk brass screws in. Sweat over both angles, just the same as if they were stayheads. If the screwheads project too far, and the boiler won't go down in position, file them off till they stand a little under 1/32 in. from the angles.

Before fitting the clips, there is one other little duty to perform at the smokebox end, viz. drilling the saddle flange for screws. If you are sweet on lots of hexagon heads, now is the chance to let yourself go, for you can drill a line of No. 51 holes close to the edge of the saddle flange, and fill them all with $\frac{1}{16}$ in. or 10-B.A. hexagon-head screws, when the smokebox is on " for keeps." However, if, like myself, you believe in utility, as long as it isn't ugly (like a " spam can," for example, or a " Q1 " class 0-6-0 !) just drill three or four No. 43 holes in the saddle flange, and use 8-B.A. round-head screws. When the slots are filled up with paint, they look like rivets ! The boiler can now be dropped into position, and a couple of clips attached to the frame, at the firebox end, to hold it down, yet allow for expansion, just as described for the smaller boiler. They are clearly shown in the illustrations, and no further detailing should be needed for that simple job. At the smokebox end, run the clearing drill through the holes in the saddle flange, making countersinks in the smokebox ; follow with No. 55 for the hexagon head screws, or No. 51 for the round heads. Tap $\frac{1}{16}$ in., or 8 B.A., according to your choice, and put the screws in. That settles that !

Finally, drill the necessary holes for the dumping-pin which supports the grate when the engine is at work. In this instance, as the grate is wider, I have shown the pin going right across the chassis. Mark off and drill the hole in the frame on *both* sides of the engine, continuing right through the sides of the ashpan. Make the pin from a $3\frac{3}{8}$ in. length of $\frac{1}{8}$ in. round steel ; or the iron wire beloved of our late friend J. A. Alexander, would do fine. Fit a turned knob on one end, and form the other to a rounded point (says Pat) by filing in the lathe. When inserting the pin, you won't have any trouble in " finding the other side," as the hole in the ashpan acts as a guide. It would not be possible to put a tube across the ashpan, otherwise the grate would not dump when the pin was pulled out.



Larger ashpan in the flat

Pipe Connections in Smokebox

The pipes are arranged in the same way, in both larger and smaller boilers. First of all, connect up the union on the end of the superheater, to the vertical pipe which is attached to the cross steam pipe ; and—very important this —don't screw it up so tightly that you either distort the cross pipe right away, or else run the risk of it happening on any future occasion, when it might be necessary to take off the boiler. A copper cone requires very little pressure to enable it to sit steam-tight on a countersink made by a centre-drill. Next item is the blower pipe and jet. This is just a length of $\frac{1}{8}$ in. pipe with a

union nut and cone on one end, and a very small edition of the blastpipe tip on the other. The pipe should be approximately 3 in. long for the larger boiler, and $2\frac{1}{2}$ in. for the smaller one. Make a union cone, and silver-solder it on one end of the pipe ; that job, also the union nut, should be easy enough without further detailed explanation ; most beginners who have progressed thus far successfully, should be quite experienced by now ! The other end of the pipe is screwed 5 B.A. ; and on it, is screwed a flea-size edition of the blastpipe nozzle, made in exactly the same way, but using $\frac{3}{16}$ in. hexagon rod. Face, centre, drill No. 40 for $\frac{1}{8}$ in. depth, tap 5 B.A. (any other *fine* thread may be used), chamfer, part off at $\frac{3}{16}$ in. from the end, reverse in chuck, and chamfer again to form the coned top. Reverse again in chuck, and carefully put a No. 70 drill down the tapped hole, feeding steadily until it breaks through.

Screw the union on to the end of the thoroughfare nipple, on the smokebox end of the hollow stay. For jobs like these, I use a special home-made spanner, which is first made like an ordinary single-ended spanner, but with a long handle. This is easily filed up from an odd bit of $\frac{1}{8}$ in. frame steel, and the spanner jaws fitted to a nut. The end is then bent at right-angles, and the other end bent to the opposite angle, to give the necessary leverage ; the jaws are then case-hardened, and we have a mighty useful tool, at practically no cost—something not to be sneezed at, in these days of skyhigh prices. The nozzle end of the pipe is bent to a curve, to enable the little nozzle to cuddle against the blast nozzle and direct the tiny jet of steam up the liner and chimney. The layout is shown in the illustration.

The blastpipe nozzle is then set to direct the exhaust steam slap up the middle of the chimney ; and the easiest way of doing this, is to use a piece of silver-steel, which is usually dead straight, of a size that just fits the hole in the nozzle. Put it down the chimney, into the nozzle ; if it doesn't stand in the middle of the chimney, like a sweep's rod with the brush knocked off, carefully bend the blastpipe until it does. Then seal the interstices around the bottom of the blastpipe and steam pipe, with a few turns of asbestos string anointed with plumbers' jointing, or some asbestos " putty " made by kneading up some scraps of asbestos millboard with a little water. This can be applied like putty, and sets hard when dry.

Finally, smear a little plumbers' jointing, or red lead and goldsize, around the inner edge of the smokebox barrel, and press the complete front home. The shape of the smaller front automatically locates it, but the circular one should be carefully set so that the smokebox hinge straps are horizontal ; it looks awful if they are skew-whiff. Next stage, running boards and side tanks.

Glasgow S.M.E. Activities

A VERY cheery letter from Mr. Allan Rodger has brought us much news of activities in the Glasgow Society of Model Engineers. The members appear to be set on challenging other model engineers to go to Glasgow for the purpose of beating certain " records " achieved in that city. For example, Mr. Rodger has sent us a copy of a display card which reads :—

DON II

Designer and Builder : **Peter Ribbeck, Esq., President of Glasgow S.M.E.**

This hydroplane, driven by a 5-c.c. compression-ignition engine, holds the British official record for a hull and engine of this size. The speed reached on its record run was 52.5 miles per hour, which beat the then existing record by 15 miles per hour.

We do not know of a comparable *hydroplane* in any country which has exceeded this speed. Our claim is going forward for a *world's record.*

We challenge anyone to beat *Don II* with a comparable hydroplane.

" WHA CAN HAUD A CAUNLE TAE A CLYDE-BUILT BOAT ? "

There is a very strong power boat section, and there is more than a possibility that further records will be claimed before long. In the workshops there is being built a hull for a cargo liner, *Clan Turnbull*, named after a very good friend, now passed. on. There may be nothing remarkable in building a hull, but it is being built by the *founder* of the society, Donald Young, who is a professional shipbuilder. The power plant has not yet been decided, but it will probably be an oil engine. Diesels are not talked about in Glasgow !

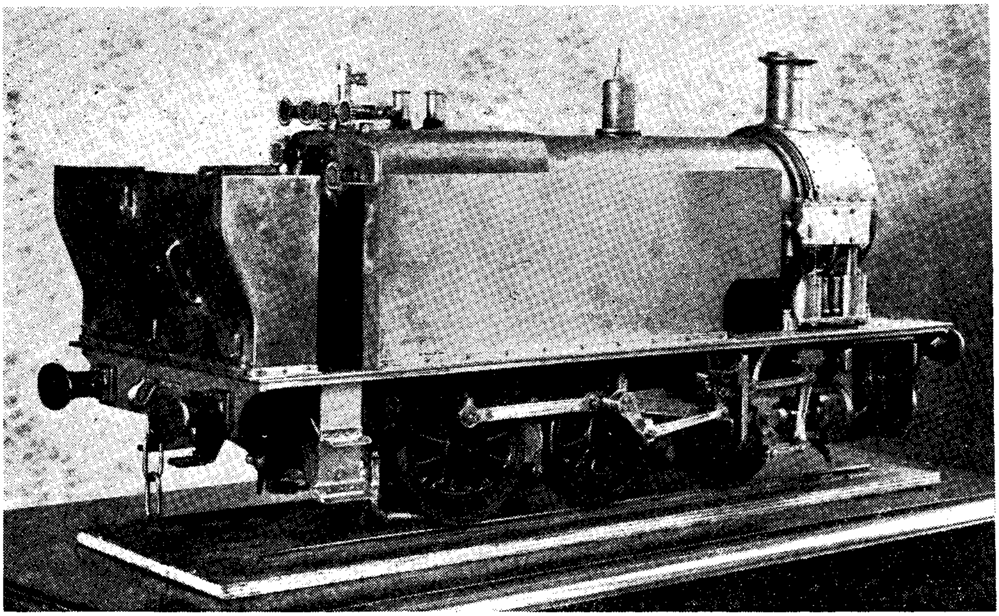
There are at least a dozen locomotives under construction ; they are not all to " L.B.S.C.'s " designs, but the builders learned from him most of what they know. Locomotives want tracks to run on, and Glasgow claims that it will have one of the best in Britain, after the opening by Mr. J. N. Maskelyne on May 26th. Anyone wishing to try out a locomotive at any time will be welcome ; he might even be granted full running powers for an afternoon, if he contacts Mr. Rodger well beforehand. But Glasgow intends to beat the record set up by the late Mr. Clogg, of Romford, with his *Cock o' the East*.

Finally, there is a very active toolmaking section ; no fewer than three lathes are being built in the workshops, one of them by a member who is a bricklayer by trade !

The enthusiasm and activity which we found in the Glasgow society a few years ago appears not to have diminished but increased ; the energy of the members is producing results which may well make themselves felt, even far outside Scotland.

ANTICIPATING "TWIN SISTERS"

THE photograph reproduced below shows what promises to be a fine 5-in. gauge locomotive under construction by Mr. E. R. Uphill, of Sudbury Hill, Middx., a member of the Harrow and Wembley Society of Model Engineers.



It is a model of a B.R. (L.M.R.) type "2F" 0-6-0 dock shunter, and was started to Jackson's drawings.

Following a talk by Mr. Austen-Walton to his club, however, Mr. Uphill modified the original design somewhat, principally in the fitting of sheet metal stretchers, sanding gear and steam brakes.

A twin-cylinder duplex pump is fitted and can be seen in the photograph, which also shows the sanding gear, boiler backhead and bunker details.

The steel water tank has copper liners, while the smokebox and funnel are built up from steel. There are 18 boiler tubes, $\frac{7}{16}$ in. diameter, with three $\frac{3}{4}$-in. superheaters. The two cylinders have a bore of $1\frac{3}{8}$ in. and a stroke of 2 in.; Walschaerts valve-gear is fitted.

The locomotive, which is, of course, coal-fired, having been two years under construction, is now almost ready for steam tests, and will add yet another to Mr. E. R. Uphill's varied stable, which includes a "Juliet" and a 2-6-0 "Marina," both of $3\frac{1}{2}$-in. gauge.—NORMAN DYER.

Test Reports

(*Continued from page* 603)

in a length of $\frac{5}{8}$ in. diameter round mild-steel.

The 3 in. diameter cutter, used in the previous operation, was again mounted on the arbor and, after the work had been set squarely and centred in relation to the cutter, a keyway, $\frac{1}{8}$ in. wide and 3/32 in. deep, was machined at a single passage over the work. Again, the machining was carried out satisfactorily and a high finish obtained.

Clearly, this milling attachment is capable of carrying out a wide variety of machining operations and, in addition, it can be quickly set up on the lathe. Furthermore, the component parts are sufficiently rigid to enable moderately heavy machining to be undertaken.

The adverse criticism offered refers mainly to two small points in the design, that is to say, the curved abutment face for the thrust-rod lock-nut, and the method of securing the gear wheels to their shafts; both these features caused trouble during the working tests: the lock-nut would not remain tight, and the gear wheels kept working loose.

When these minor defects have been remedied, and perhaps a little further attention given to the shaft bearings, the attachment should prove a valuable aid to machining in the small workshop, where it will be found capable of taking the place of much more expensive equipment.

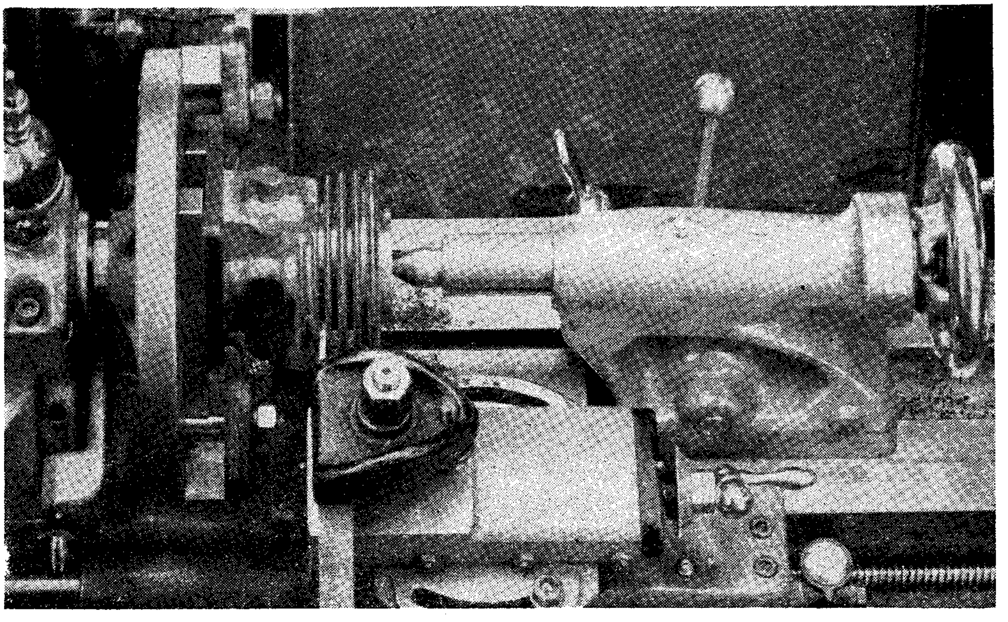
PETROL ENGINE TOPICS

*A 50-c.c. Auxiliary Engine

by Edgar T. Westbury

ON many occasions in the past I have stressed the importance of accuracy in the machining and finishing of cylinders for all types of i.c. engines, and two-stroke engines in particular. While this engine does not necessitate such meticulous precision in this respect as engines of very small capacity, it will be found worth while to take the utmost pains to ensure that the case, the boring of the actual working surface involves much the same procedure, and a fairly hard and durable metal for this surface is most essential.

I do not ignore the merits of using a light alloy cylinder with a thin inserted liner, which would enable a substantial amount of weight to be eliminated, and also improve heat conductivity.



Using grooving tool to clean up cylinder fins. (Note the steady pad on the mouth of cylinder to take back centre)

cylinder bore is exactly parallel, circular and highly finished, as these factors have far-reaching effects on the efficiency and durability of the engine. It may here be emphasised once more that we are aiming at an engine which will have a working life, in terms of running hours, far greater than that of most miniature engines.

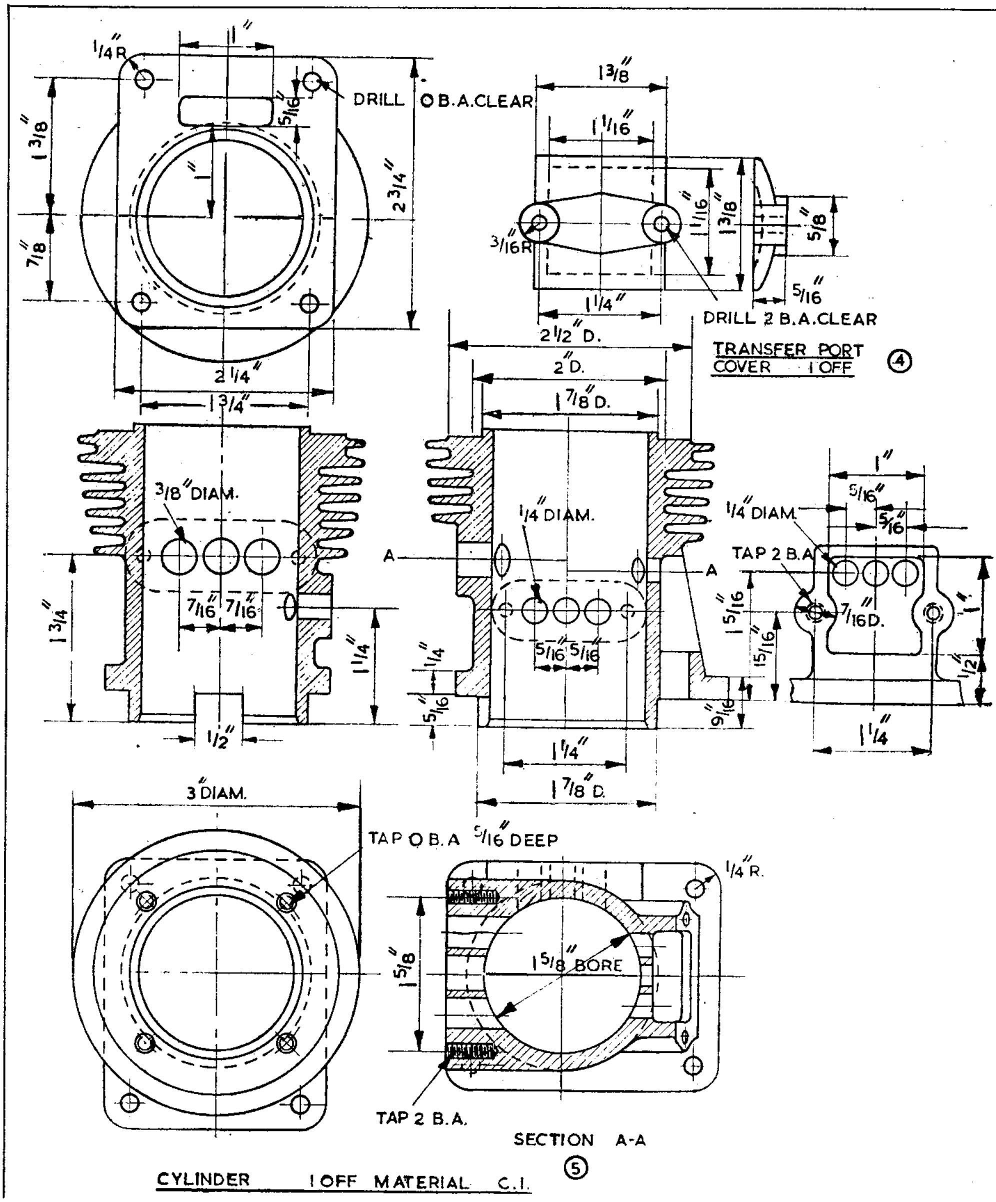
A solid iron casting has been chosen for the cylinder, after careful consideration of alternative forms of construction. Many amateur constructors tremble at the idea of machining a large cast-iron cylinder, but in actual fact the total amount of work involved is usually less than in a fabricated or inserted-liner type of cylinder ; in any

But the proper fitting of the liner is more difficult than it sounds, and any error in this respect may tend to cause distortion of the liner, or imperfect contact with the outer cylinder, which would impair cooling. The possibility of casting-in the liner, which would enable these risks to be avoided, has also been given careful consideration, but this entails a die-casting process which could only be justified in fairly large quantity production. It may be remembered that the "Ensign" 10-c.c. engine has a die-cast cylinder with a carbon steel liner cast in, and this has been quite successful in practice, but even in this size is hardly profitable to produce.

Cylinder Boring

The cylinder casting does not need marking

*Continued from page 544, "M.E.", April 26, 1951.

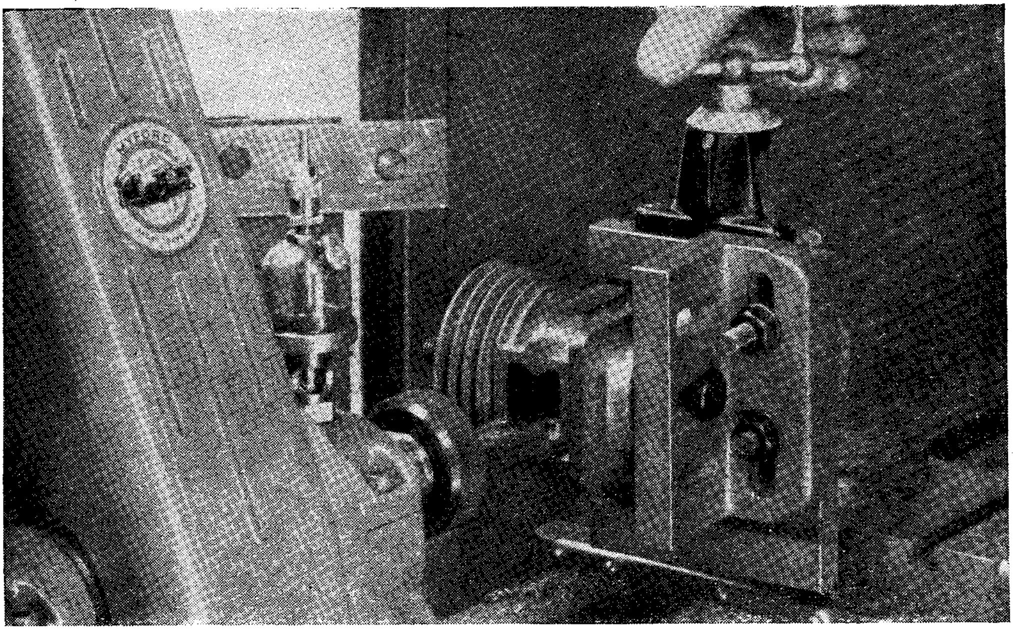


TRANSFER PORT COVER 1 OFF ④

CYLINDER 1 OFF MATERIAL C.I. ⑤

out, but a preliminary check of dimensions should be made, to locate the position of end faces relative to that of the port flanges, which must necessarily govern the amount of metal to be removed from the former. It is permissible to chuck the casting from the head end, gripping it over the outside of the fins in the four-jaw chuck, with soft metal pads under each jaw to distribute the pressure. This method could not be recommended in the case of a light cylinder casting, owing to the risk of distorting the bore by pressure on four points ; but the large diameter fins and general solidity of the casting enable it to be done in this case. The alternative method, entailing a good deal more work, would be to face the top surface and machine the spigot first, then attach a register plate to the lathe faceplate and machine it on the bore and face to fit the cylinder spigot ; the casting could then be held in place by suitable clamps to hold it back against the register plate.

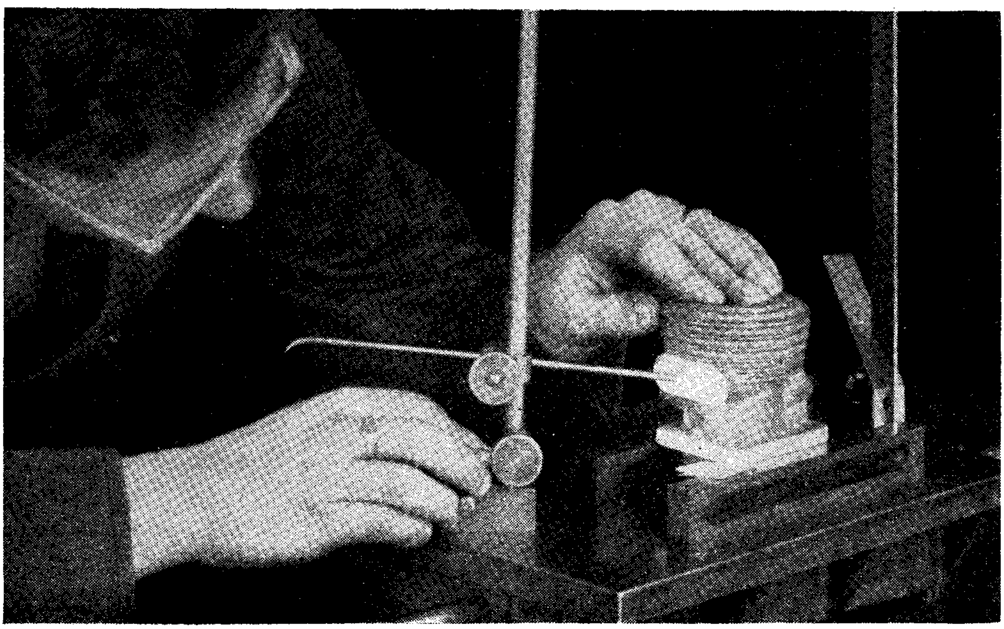
Whatever method of holding the cylinder is employed, however, it should be set up so that



Milling transfer port cover face

it runs reasonably truly over the outside of the fins, and also over the spigot at the skirt end; do not worry too much about the truth of the rough bore, unless there is any risk of not cleaning up properly to finished size, which should not normally arise.

A rigid boring tool is most essential for producing an accurate cylinder bore; I favour the use of a bar not less than 1 in. diameter, with a squared butt end to grip firmly in the toolpost, and an inserted cutter of $\frac{1}{4}$ in. square high-speed steel, set diagonally in the other end. Care should



Marking-out cylinder ports

be taken to avoid any risk of the cutter running beyond the bore and damaging the chuck face; the use of a parallel packing ring behind the casting will prevent this; alternatively, a mark may be made on the tool to show the depth limit, or a stop set to prevent excessive travel of the saddle.

Use the slowest back gear speed for the initial cut through the cylinder bore, and if possible, take a deep enough cut to get right under the skin of the metal. It is more than likely that the tool will very quickly become blunt in getting through the sand and scale in the cored hole, but do not worry if you have to regrind the tool two or three times before you get down to clean metal; and above all, never try to keep a blunt tool cutting by sheer brute force. The use of a fine self-acting feed is very desirable for cylinder boring, and carbide-tipped tools are extremely useful, avoiding the need for frequent regrinding, though by no means the necessity they are often represented to be.

Some small lathes may make rather heavy going on the machining of large iron castings, but patience and care will always win through in the end. It may, however, be stated that the Myford M.L.7 handled this job without turning a hair. It is obviously important that spring and deflection of the tool should be eliminated as much as possible, and correct adjustment of all slides is an important factor in this respect.

For roughing operations, an angular tipped tool, with zero or negative rake, will be found most efficient. After the skin has been removed, the lathe speed may be increased by shifting the belt to the middle cone, and top back-gear speed is permissible for finishing. The final cut may be made with a keen round-nose tool, and several passes should be made at the same setting of the cross-slide, to eliminate the effect of spring.

The bore should be left about 0.002 in. undersize for lapping allowance; this may be measured by setting inside callipers to a suitably adjusted 2 in. micrometer or vernier gauge, but if these instruments are not available it may be found possible to refer to some object of standard dimension, such as a shaft or ball-race. Although dimensional accuracy is not in itself of the highest importance, it should be noted that the engine is to be fitted with standard $1\frac{3}{8}$ in. piston rings, and any considerable deviation from this dimension may interfere with their proper fitting and function.

The outside of the cylinder spigot and the bottom face of the flange, are also machined at this setting, and the mouth of the cylinder is chamfered to an included angle of 60 deg. to give a "lead" to the piston rings on assembly. If the latter operation is done before facing the flange, a pipe centre may be used to steady the end of the casting during the latter operation. Note that the spigot must be a close fit in the bore of the crankcase seating.

For facing the top surface of the cylinder, the best method is to mount the casting on a mandrel, but as it may be difficult to find one of suitable size, an alternative way is to mount the casting on the faceplate, with a parallel distance ring or two parallel bars under the base flange, and clamps bearing upon the latter. Or it may be held over the flange in the four-jaw chuck, with the spigot bedded firmly against the chuck body. In either case, of course, the cylinder bore must be set to run truly.

At the same setting, it is desirable to run a narrow tapered tool between the cylinder fins to clean them up to their proper width and depth, as this cannot be assured in the rough casting. As this is a rather heavy operation, which must be done at the slowest speed, it is advisable to steady the casting with a centred disc held against the mouth by the back centre.

Milling the Port Faces

The three facings for exhaust, transfer and inlet ports respectively must be truly flat, but the means of attaining this end will depend upon the equipment available. They may, if desired, be hand filed and scraped, working to accurate "flats" of suitable size, such as slips of heavy plate glass. A small hand shaper will do the job more rapidly, and possibly more accurately. But following the principle of carrying out all the machining in the lathe, they were, in the examples illustrated, machined by milling processes, with the aid of the Myford swivelling vertical slide, and a small angle-plate attached thereto.

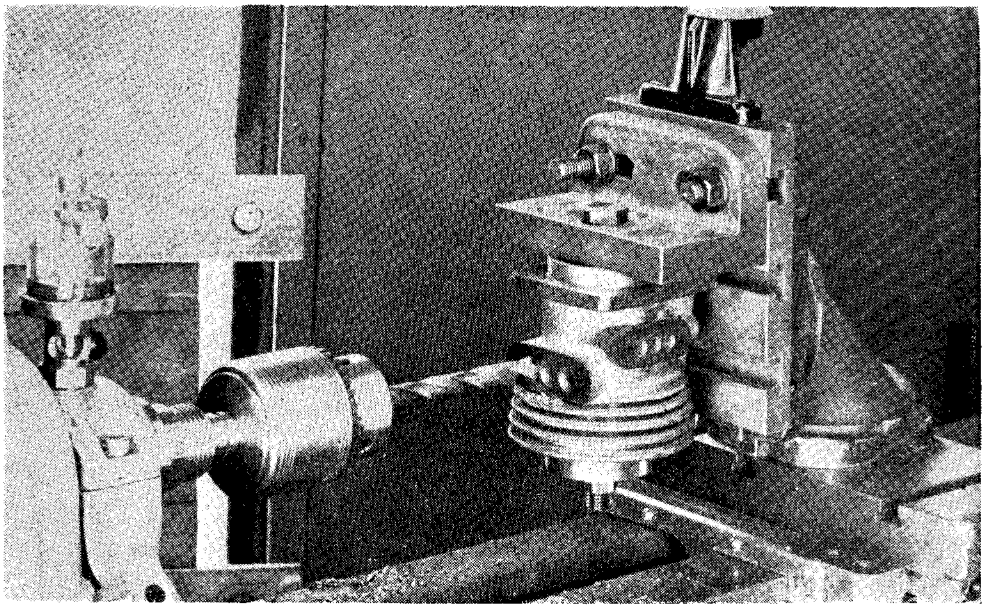
The exhaust and inlet facings are square with the cylinder both ways, and also with each other. As there is no machined reference face to locate them in the latter respect, and critical accuracy is unnecessary, it is sufficient to align the inlet facing from the long side of the base flange as closely as possible, and after machining, square the exhaust port from it. The cylinder is mounted on the angle-plate by a single $\frac{3}{8}$-in. bolt through its centre, and a flat disc at the top end; for dealing with these two faces it will be found most convenient to mount the angle-plate near the top of the vertical slide, with the cylinder inverted.

A somewhat different arrangement is necessary for milling the transfer port facing, the cylinder being set horizontally and the base of the vertical slide swivelled to suit the location of the face, which is inclined at an angle of 10 deg. to the cylinder axis, though square with the other two facings in the cross-plane. An end-mill, held in the Myford collet chuck, was used for these operations, though it could quite well have been held in the three-jaw chuck, and a home-made facing cutter would also have done the job just as effectively.

The location of these facings relative to the cylinder axis are not of critical importance; the essential thing is to ensure flatness and reasonably good finish of the surfaces, and the cutter should be run all over the exhaust and inlet faces, and all round the transfer port face, with the saddle feed locked, for the final cut.

Drilling Cylinder Ports

It will be seen that all the ports on this engine are in the form of round drilled holes, a procedure which has been found quite successful in several of my previous engines, and which has certain advantages in cases where it is not absolutely essential to use ports of maximum area. In the first place, it is easier to locate and form the ports



Drilling exhaust ports

than when they are rectangular or otherwise shaped ; secondly, it avoids the need for pegging the piston rings, provided that the individual ports are not too large in diameter. This, however, is an optional feature, and it would be quite easy to square out or elongate the ports after drilling ; I am not, however, prepared to guarantee that this would produce any improvement in performance, as the port areas are adequate for the speed at which the engine is intended to run under load.

The port positions should be marked out with the aid of a scribing block, working from the base flange ; parallel packing should therefore be used to support the flange, and all height measurements taken from this point, such as by the use of a combination square set on the packing bars as shown in the photograph.

It is possible to drill the ports in a drilling machine, but if the vertical slide is available, it may as well be utilised for this operation, and it will help to ensure that the holes are truly located. A centre-drill should be used first of all to act as a pilot, and should be entered to the full depth of the countersink, after which the twist drill will follow without deviation. Note that any alteration in the sizes of holes will affect port timing, apart from their actual centre locations, so both points should be adhered to as closely as possible. It may, however, be mentioned that correction of port timing is possible after the engine is built, either by manipulation of piston length or by packing under the base flange, so it is not necessary to scrap a cylinder on account of minor errors in drilling the ports.

(To be continued)

A Souvenir Pamphlet

To commemorate the run of the last Ivatt G.N.R. Atlantic locomotive No. 62822, an eight-page pamphlet has just been issued by British Railways. On the front page, there is a small reproduction of the headboard which the engine carried on her smokebox door.

Three of the inside pages are devoted to six photographs taken on the occasion ; these include a striking shot of the special train at speed near Maxey Crossing, and a nice reproduction of what, in our opinion, is one of the finest and most characteristic photographs ever taken of an Ivatt Atlantic—No. 62822 posed in the yard of her home shed, Grantham, just before she left it for the last time. Copies of the guard's journals for the outward and inward trips are included, together with a foreword and some notes about H. A. Ivatt and his Atlantics.

The pamphlet, called " Ivatt Atlantic Special," is available, price 6d., from the Public Relations and Publicity Officer, British Railways, Eastern Region, Marylebone Station, London, N.W.1.

Novices' Corner

Simple Drilling Jigs

A DRILLING jig is used to guide the drill so that a hole is thereby accurately located, and marking-out the drilling centre on the work is then no longer necessary.

This principle is generally adopted when securing two parts together by means of screws, bolts, or rivets. For example, when bolting together the two parts illustrated in Fig. 1, the upper plate is first marked-out and the bolt holes are drilled with a clearing-size drill. This plate can now be used as a jig for boring the holes accurately in the lower part. For this purpose, the two parts are first correctly aligned by means of a square or a straight-edge, and a toolmaker's clamp is then applied to hold them firmly in position. When the work is placed on the table of the drilling machine, two parallel packing strips are used as supports and also to keep the clamp clear of the table surface.

If the clearing size drill is now entered in each hole in turn and put right through the work, the bolts for securing the parts will be found to fit into place quite freely.

Poor Workmanship

If, on the other hand, an attempt is made to locate the bolt holes by marking-out and drilling the parts separately, it may be found that all the bolts will not enter at the same time, and this may necessitate correcting the position of one or more of the holes with a file ; needless to say, any need for correction indicates poor workmanship and may involve a great waste of time.

A pair of small parts can quite well be drilled both at the same time, but when one part is large or unwieldy it is better to drill the smaller first and use it as a drilling jig in the way described. Where parts are secured together with rivets, the method of drilling is similar to that used for fitting bolts, but with screws the manner of drilling the work is a little different. Again, if the parts are drilled separately and one is afterwards tapped, difficulty may be found in getting the screws to enter. To avoid this, one part is drilled to the clearing size and, when clamped to the other, is used as a drilling jig to locate the tapping-size holes.

This operation is illustrated in Fig. 2, and it will be seen that the clearing-size drill enters the lower part far enough to prevent any burrs being set up during the subsequent tapping operation. Next, the tapping-size drill, guided by the drilled recess, is put right through the work or to the depth required. To finish the hole, the reverse side of the work is also counter-bored for a short distance with the clearing-size drill ; this is done to stop the tap setting up burrs which would have to be removed by filing. When it comes to tapping the holes, it is advisable, for greater security, to grip the parts in a pair of toolmaker's clamps rather than to rely on a single clamp. The upper part has already served as a drilling jig, and it will now form a guide for the tap during the threading operation ; moreover, if the tap will pass in correct alignment through both the parts, so will the screws.

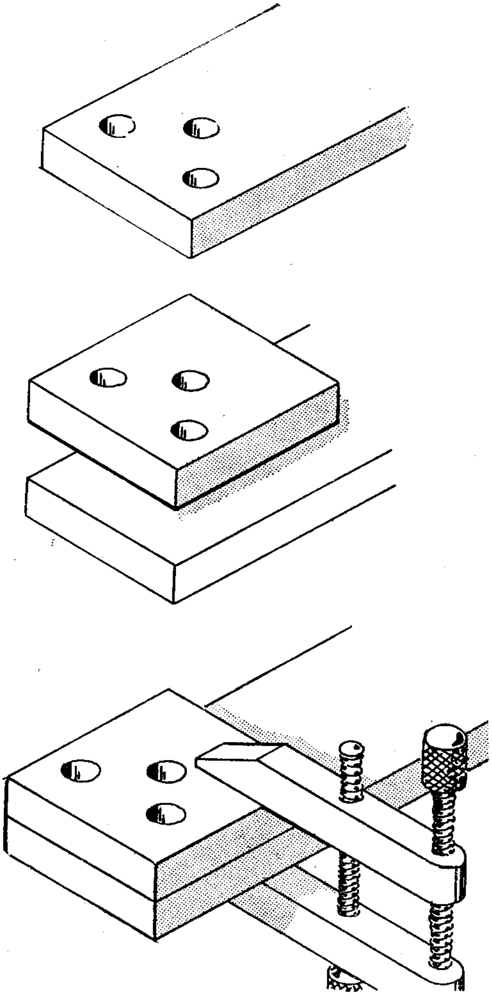


Fig. 1. Using a drilled part as a drilling jig

When assembling a piece of work which has several almost similar parts, it may be found a great help if the mating parts and their relative positions are indicated by marks ; small figure- or letter-punches may be used for this purpose, as shown in Fig. 3, but, failing these, the identification marks can be made with an ordinary centre-punch, and the work surface afterwards smoothed with a fine file.

Where a batch of parts made from round material has to be cross-drilled accurately through

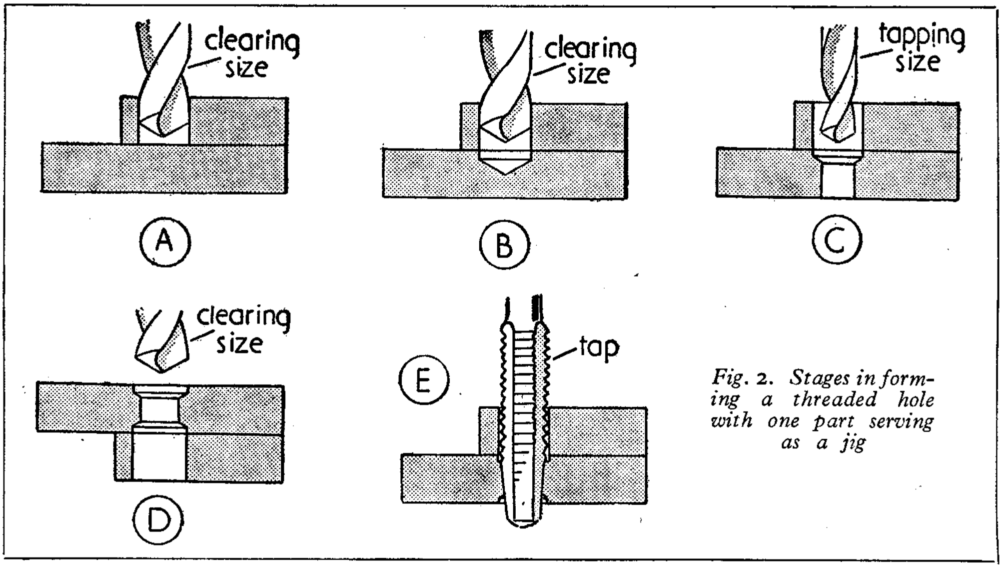
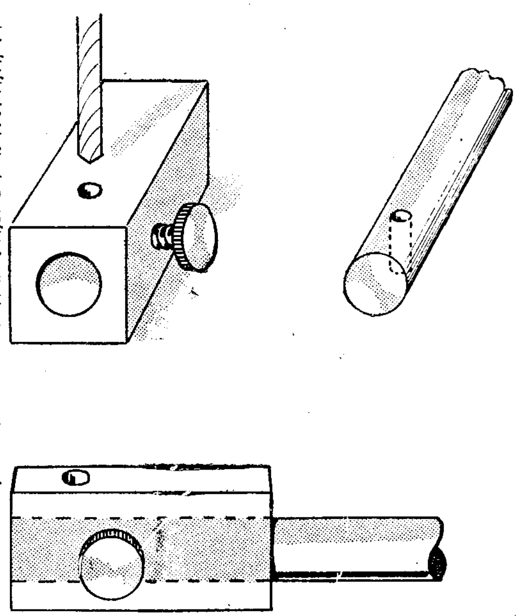


Fig. 2. Stages in forming a threaded hole with one part serving as a jig

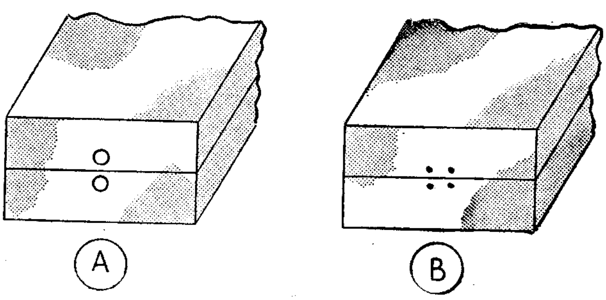
the centre and at an exact distance from the end of the work, time will be saved and uniformity will be ensured if a small drilling jig is made of the kind illustrated in Fig. 4. The length of square steel or brass selected for making the jig should be tested with a square to make sure that the upper and lower surfaces of the material are square with one of the sides, and so are parallel with one another. The base must also be flat to prevent any rocking of the jig when in use; test this surface on the surface plate and, if necessary, remove any high spots with the scraper or file. Next, the work is set to run truly in the four-jaw chuck, and the hole to receive the shaft is first drilled and then machined to a close push fit with a boring tool.

Marking-out

The guide hole is now marked-out with the jenny calipers, on the centre-line of the upper surface, and at the required distance from the end of the bar; the hole for the clamp-screw is also marked-out in the same way. After the points of intersection of the marking lines have been centre-punched, these centres are enlarged with a centre-drill to form a guide for the drills used to bore the guide and clamp-screw holes. Any burrs set up in the bore by the drilling and



Above—Fig. 4. Jig for cross-drilling a shaft



Left—Fig. 3. Identification marks to aid assembly. "A"—figure-punch marks; "B" centre-punch marks

tapping operations must be carefully removed with a smooth, round file. To avoid marking the shaft, when the jig is in use, it is advisable to place a small brass or fibre disc between the work and the tip of the clamp-screw. To load the jig and, at the

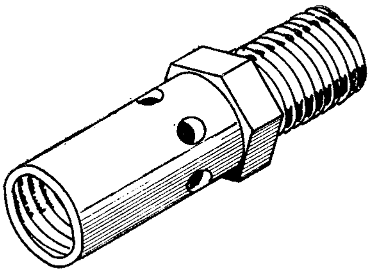


Fig. 5. A valve body with a circle of drilled holes

same time, to locate the shaft correctly, the jig is stood on end on the surface plate and the shaft is pushed in until it, too, meets the plate ; the clamp-screw is then tightened and the work is ready for drilling.

The appearance of the small safety-valve illustrated in Fig. 5 will be much amiss if the six holes shown are not evenly spaced or are out-of-line. To ensure regular drilling, the small jig illustrated in Fig. 6 may be employed, and time will certainly be saved thereby if a batch of these parts has to be machined. The short length of hexagon bar used to make the jig is first bored centrally when gripped in the self-centring chuck ; the centre distance for the holes, measured from the faced end of the bar, is then marked on all the flats with the jenny calipers. There are, of course, several methods of marking-out the centre-lines along the flats, but probably the easiest way of locating the guide holes is to use a small rule to set the point of the centre-punch at the centre of the distance lines.

The rest of the constructional work is similar to that already described, but it should be noted that two faces of the jig will have to be tapped for clamp-screws, so that, by removing one screw

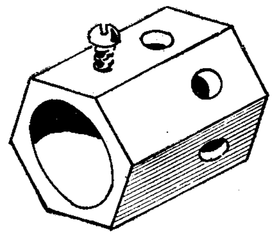


Fig. 6. Jig for drilling holes located on a circle

at a time, each of the flats can in turn rest on the drilling-machine table. To locate the work correctly, the valve body is pushed inwards until the face of its hexagonal boss abuts against the end of the jig.

A HACKSAW REFLECTOR

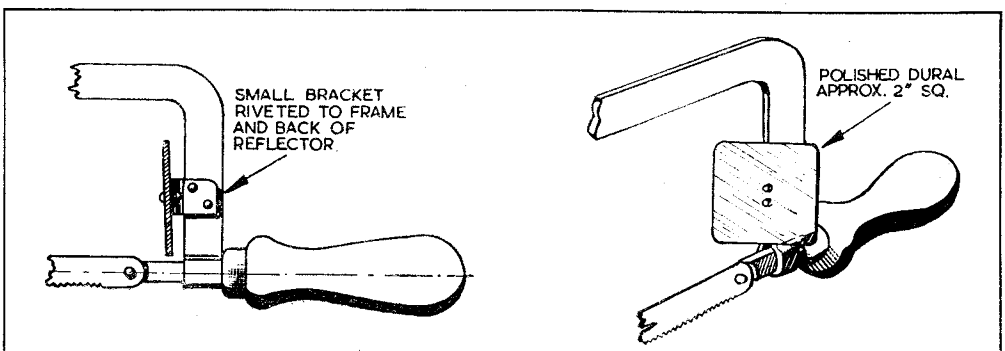
HOW many of us have wished, when hack-sawing to a line, that the light was in the right place, allowing us to really see where we were going. I am sure that most of our scrap-pieces are caused by just not being able to see—and nothing else.

My own solution to this problem consists of fitting a small reflector, made of dural and polished, to the rear member of the saw frame.

With the light in its normal position over the bench, it simply reflects the light on to the line being cut.

Of course, a proper mirror would be better but very easily broken, and I have found the polished dural does all that is required.

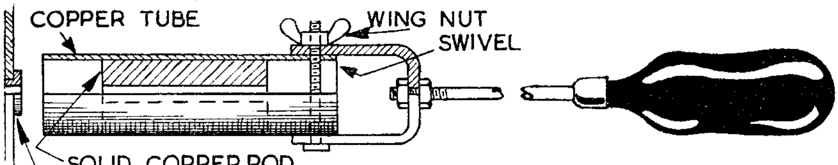
As can be seen from the sketch, it is easily made and adapted to any type of saw frame, so no dimensions need be given.—TIM.



PRACTICAL LETTERS

A Soldering Iron for Awkward Places

DEAR SIR,—No doubt many readers, like myself, have from time to time had to sweat small collars into model boilers or metal containers of various kinds and had to struggle with the job with an ordinary soldering iron because the proximity of some other soldered joint prevented the use of a blow lamp or gas torch, or possibly not possessing either of those articles! Even with an electric soldering-iron the bit can only be applied tangentially to the collar. I have successfully overcome this difficulty by making a soldering iron with a tubular bit, as shown in the sketch herewith.



To add weight to the bit, and also to add to its heat-retaining property, the tube is fitted for the greater part of its length with a piece of solid copper rod, a hole being drilled throughout the length of the rod to allow any vapour or gases to escape instead of blowing out round the working edge of the bit and so spoiling the joint. The tube was made long so that where necessary a blowlamp or gas torch can be played on the upper end without endangering nearby soldered joints and obviating repeated re-heating of the bit. I have found the bit very useful, as it makes a very clean and neat joint in quick time. The tubular bit can be made of any diameter to suit the jobs in hand. I have made two, one ½ in. diameter and the other ⅝ in. which cover a good range of collar sizes.

If ordinary solder is used it is an advantage to shred up some solder and place it round the article to be sweated in, but with Fryolux solder paint all that has to be done is to paint round the collar and apply the iron.

The swivel joint enables the iron to be used at any angle, thus facilitating jobs in awkward places.

Yours faithfully,

Bury St. Edmunds. W. C. MARTIN.

Canvey Island Railway

DEAR SIR,—I was very interested in the letters recently concerning the Canvey Island Railway, and perhaps the following information may be added to that of your correspondent, Mr. C. R. H. Simpson.

I think I am right in stating that no Canvey Island Railway ever existed; but there was, between 1905 and 1910, a company called the Canvey Tramway Company who built a line across the island from the ford where the bridge now stands. The track was laid and posts with overhead wires were erected, but whether rolling stock was ever delivered I do not know; but at the time, I was told that the concern had no money to complete the enterprise. The last time I was on the island was about 1912, so have never been on the bridge that I am told now connects the island with South Benfleet.

While on the subject of things that have passed, I wonder how many of your readers remember *Junior Mechanics*, an excellent journal for the beginner. Although I am not yet 50, I can well remember making the electric motor described in the first issue as "an electric motor made in five minutes."

It would perhaps interest your readers, who have in mind establishing a business, that after very many years at engineering I came to Sussex in 1945 and established a successful *glass* business, a subject of which I knew absolutely nothing, and have only during the past year commenced an engineering side of the business. Perhaps one day I may write the history of my business which is now a limited company.

Yours faithfully,

—SHOREHAMITE.

Old Beam Engines

DEAR SIR,—I was very interested in Mr. Law's letter, "Old Beam Engines," in the March 8th issue of THE MODEL ENGINEER, especially when, many years ago, I was conversant with the four Cornish pumping engines working at the old "Wyndham Iron Ore Mines," Egremont, Cumberland. These were the only Cornish engines to ever work in the Egremont district.

Wyndham Mining Co. operated the following mines: Falcon Pit, No. 3 Pit, Gillfoot No. 4 Pit, and Helder Pit. The depths of these shafts in the order just mentioned were: 102 fths., 85 fths, 115 fths. and 217 fths.

The Cornish engine at Falcon Pit had a cylinder 50 in. in diameter by 8 ft. stroke, and a solid, cast-iron, overhead beam. It was built by Messrs. Dick & Stephens, Airdrie, Scotland; was installed in 1892 and worked until 1912 when the mine ceased operations. The engine was eventually scrapped in 1916. The valves on the engine were operated by cataract gear in conjunction with a rectangular, highly-polished, tappet-rod which carried the tappet-wheels and steam cut-off slide for closing the exhaust, steam and equilibrium valves. Perched mid-way on this tappet-rod was a large brass falcon with outspread wings giving it the appearance of

being in flight when the tappet-rod moved up and down. The cylinder, exhaust-valve casting, steam and exhaust pipes were lagged with polished pitch-pine, secured by three, 3 in. brass straps.

The engine was beautifully finished and its 20 years trouble-free record proved its efficiency.

No. 3 Pit: The Cornish engine at this mine was the most beautifully designed one I have ever seen, and to pay it a due compliment, was the "last word" in Cornish engine design. Designed and built by Messrs. Dick & Stephens, Airdrie, Scotland, it was installed in 1884 and worked until the mine closed down in 1924. The mine was dismantled before the end of 1925 and the engine scrapped. This engine had a cylinder 70 in. diameter by 12 ft. stroke with the double steel beam situated underneath. The cylinder, exhaust-valve casting, steam and exhaust pipes were lagged with polished mahogany and the floor underneath the hand-gear was black and white tiled. The hand-gear was of massive construction, highly polished and so conveniently arranged that it left nothing to be desired by the attendant. The opening of the valves was by cataract-gear: the closing being by the wheels and cut-off slide mounted on the twin rectangular tappet-rod which carried a screw and wheel arrangement for adjusting the steam cut-off slide. When about to be scrapped the engine was in sound condition and would have performed another forty years.

Gillfoot No. 4 Pit: The Cornish engine at this pit was designed by the late Mr. Joseph Henry Woolcock, Engineer, St. Bees, Cumberland, and was built by Messrs. Lamberton & Son, Coatbridge, Scotland. The engine carried a brass plate on which was the name *Bydie*, which I understood was the name of Mr. Woolcock's daughter.

Prior to the engine being installed at Gillfoot No. 4 Pit in 1909 it worked for many years at the old Dalmellington Pit, Frizington, Cumberland. This engine had two 7 in. diameter piston-rods fitted to the piston and the double steel beam situated below the cylinder. It saw the best of its working days in June 1917, when one morning, it came out of the pit under full steam with only one spear-rod attached to the beam. The engine was extensively damaged—worse luck, I was unfortunately in charge of it that morning. The engine was broken up in 1921, three years before the mine ceased working.

Helder Pit: This engine was an outsize in Cornish pumping engines. Prior to being installed at Helder Pit it worked at the old Stank Mines near Barrow-in-Furness. The cylinder was 100 in. in diameter by 14 ft. stroke. The 60 tons overhead, cast-iron beam was perched on the 12 ft. thick brick wall of the massive engine house. The piston-rod, a massive one, was 17 in. diameter.

It worked up to the year 1916 when, owing to its costly performance, it was replaced by two Mather & Platt electric pumps. The engine was scrapped in 1922 and the mine ceased working in 1924.

Mr. Law asks for information regarding the small Cornish pumping engine still working at the Ullcoats and Florence Iron Ore Mines, Egremont, Cumberland, but I cannot give any information concerning this. The pumping at Florence mine is done by electric pumps, and at the Ullcoats No. 7 mine by a horizontal, bell-crank, triple-expansion engine built by Hathorn & Davy, Leeds, about the year 1915. Perhaps Mr. Law refers to the old "Grasshopper" beam engine which used to be at the Ullcoats old No. 2 mine and which was scrapped when the mine ceased working many years ago.

The Grasshopper beam engine was very like a Cornish engine, but was not a Cornish engine proper. It had an overhead beam with the piston-rod fitted approximately one third way back from the spear-rod and towards the other end of the beam which was the fulcrum end. Steam was admitted to the bottom end of the cylinder which forced the piston to lift both the beam and spear-rods.

The tappet gear was similar to the Cornish engine, but faced the fulcrum end of the beam, whereas the tappet gear on the Cornish engine faced the spear-rod end. The Grasshopper engine did not work in the see-saw fashion of the Cornish engine, but more resembled the old Bull engine. There were two other Grasshopper pumping engines in the Egremont district many years ago; one at the old "Pallaflat" No. 2 mine, Bigrigg, near Whitehaven, which was scrapped in 1910, the other at "Moss Bay" No. 6, Woodend, near Whitehaven, this was scrapped in 1927.

Yours faithfully,

Dalton-in-Furness. J. CAVANAGH.

Aluminium Equipment in Refrigeration Systems

DEAR SIR,—Regarding Mr. Dunn's letter in THE MODEL ENGINEER of March 8th, I would like to point out that in the Boeing Strato-cruisers as used from this country, there are two cooling systems for air-conditioning, using in all 88 lb. of Freon 12, or at the present time Arcton 6, which is the I.C.I. equivalent. The thing to note is that the whole of this cooling system, i.e. compressor, condenser, expansion valve body, evaporator and pipe lines are of aluminium or aluminium alloy.

Having been working on these aircraft for the last 18 months I speak from experience. There is some gas loss, but that is attributable to the multiplicity of joints necessary in this system. Not being able to use the Halide leak torch, for obvious reasons, on the aircraft a red dye called "Trace" is used for leak detection, and invariably shows up at joints.

The greatest enemy of Freon in any refrigeration system is moisture, more so than SO_2 or Methyl chloride; where aluminium alloys are used, it is deadly.

To hazard a guess in the system mentioned by Mr. Dunn, I should say that the system was filled with no dehydrator in the line or filled without thoroughly drying out the system before filling, or even not purging system after filling.

I may add that the compressors (2) working hours were put up from 2,000 to 4,000, as they were in such good condition after 2,000 hours.

Yours faithfully,

Bristol. J. BRADLEY.

Traction Engine Exhibition

DEAR SIR,—As one of the other associates interested in the preservation of traction and other engines in Thetford which form the subject of one paragraph in "Smoke Rings" in your issue of April 19th, may I mention we have another aim?

This is to place on some suitable part of St. Nicholas Works, in Thetford, a plaque stating to the local inhabitants and visitors that therein was built the first heavy-duty steam road engine in 1856. If funds permit, we hope to depict a Burrell-Boydell engine of this period in relief, the whole to be in some bronze alloy or similar material.

This is an aim quite distinct from any Festival activities, and we intend to invite some engineer prominent in technological history to unveil it, backed up—we hope—by the Technical Press.

Yours faithfully,

Norwich. RONALD H. CLARK.

CLUB ANNOUNCEMENTS

Barry Model Railway Club

Since the above club was formed over a year ago, four exhibitions have been held with success, the main attraction of which was the gauge "O" layout. The installation of electric point motors and colour-light signalling has now been completed.

The "live steam" section is now in sight of successfully completing the first of several locomotives, and in anticipation of this, work has commenced upon the club's portable track.

A number of members have been fortunate in being able to visit a private owner's layout and enjoyed the thrill of being allowed to be "up behind her in steam."

Hon. Secretary: C. ALEXANDER, 99, Court Road, Barry, Glam.

Kodak Society of Experimental Engineers and Craftsmen

A recent meeting of the above society was devoted to a talk on the art of working and polishing various kinds of wood, which was ably given by Mr. Charles Greenwood, who had brought along several examples to illustrate the various stages of the process.

The speaker stressed the necessity of thoroughly getting to know the various kinds of wood and their make-up, as well as substitute or "complimentary" kinds of timber, which would readily pass for the more expensive kinds. To quote one examples—American white wood can be substituted for mahogany or walnut.

Mr. Greenwood then dealt with the various stains and expressed a preference for a spirit stain, though in one or two cases it is more desirable to use a water stain.

He then turned to "filling" and expressed the view that the best medium to use was plaster of Paris. As far as actual polishing was concerned, he stressed the necessity of using only small amounts, but with plenty of rubbing with an even, circular movement.

The evening closed with many questions put to the lecturer (who was obviously a master of his craft) from an enthusiastic audience of some 40 members and friends.

Hon. Secretary: E. G. TOTMAN, Kodak Hall, Wealdstone, Middx.

The Tyneside Society of Model and Experimental Engineers

At the meeting to be held at the headquarters of the Newcastle Photographic Society, 6, Rutherford Street, Newcastle-upon-Tyne, at 2.45 p.m., on June 2nd, a talk will be given by Mr. Jones, of the Northern Gas Board.

Hon. Secretary: L. JAMIESON, 34, Dorcas Avenue, Pendower, Newcastle-upon-Tyne, 5.

Brentwood and District Model Engineering Society

At the last meeting, Mr. Frank Simpson gave a very interesting talk on the building of the Great Eastern Railway, and at question time was a mine of information. At the end of the meeting Mrs. Westlake's Challenge Cup was presented by Mrs. Westlake to Mr. Richardson, for the best engineering model at the Brentwood Handicraft Exhibition.

The club, now the better weather has come, will make a start on its workshop in Primrose Hill. Members are requested to tear themselves from the garden and spend as much time on the building as possible.

"Simpson's Day," on May 12th, will be the first track day the society has held since it started life two years ago. This will be held annually, if possible.

Hon. Secretary: DONALD J. F WHITE, 38, Kings Road, Brentwood Essex.

Hull and District Society of Model and Experimenta Engineers

The following works visits have been arranged for the summer months:—

June 2nd. T. H. Fenner & Co., Hull, 10 a.m.
July 8th. British Railways Botanic Sheds, 10.15 a.m.
August 25th. Blackburn Aircraft Co, Brough, 10.30 a.m.

A number of dates have been arranged for us to attend summer fetes with our portable multi-gauge track, 200 ft. long, for charity purposes.

Hon. Secretary: G. S. SHEPHERDSON, 25, Dryden Street, Westcott Street, Hull.

The Coventry Model Engineering Society

Owing to various reasons, the above society have decided not to hold a regatta this year. However, preparations are going ahead for an exhibition to be held on September 12th-15th.

Future meetings are as follows:—

May 11th. Problems night.
May 20th. Visit to Foleshill gas works.
May 25th. Lecture and demonstration on "Flat-scraping,' by F. K. Baron. (Member.)
June 8th. Meeting at Nauls Mill Park.

Hon. Secretary: L. J. BEDDER, 105, Butt Lane, Coventry

Brighton and Hove Society of Model Engineers

At the meeting of this society held on Friday, March 30th, members were told something of the very early days of technology when Mr. George Clasby, whose many attainments include a wide knowledge of archeology, gave a talk on the manufacture of Stone Age implements. This he illustrated with specimens that he himself had discovered locally which left us in no doubt of the high standard of craftsmanship displayed by our remote ancestors. His talk was very well received indeed and it is hoped that he will be able to satisfy the interest aroused by telling us something of the work of the later prehistoric craftsmen in the near future.

On Friday, April 13th, Mr. G. H. Davis, who needs no introduction to ship-modellers, told us something of the work of the professional ship-modeller, illustrating his talk by photographs of work proceeding on the giant new model of the *Queen Elizabeth* to be displayed at the Festival of Britain.

The annual general meeting of this society is to be held at the clubroom, 14, Goldstone Street, Hove, on Thursday, May 10th, at 7.30 p.m. It is hoped that as many members as possible will endeavour to attend.

Hon. Secretary: R. T. EARLE, 14, Old Shoreham Road, Portslade, Sussex.

North London Society of Model Engineers

Will secretaries of clubs affiliated to the S.M.E.E. note that the above society will hold an "Affiliation Day" at the Barnet Water Company's Sports Ground, Arkley, Herts, on May 20th. A full programme covering all model interests is being arranged. Locomotives, aeroplanes, and model cars will be in action, and live steam will be laid on for demonstration of home and visitors' exhibits. Yachts and boats, miniature railways and science and research sections will be well represented. A "junk stall" will be featured and visitors are invited to bring any items of which they wish to dispose. It is hoped to make this one of the big events of the year, and should be worth a visit by members of even distant clubs.

Admission is by ticket which carries on reverse side a plan of the site with bus routes. The ground is easily reached from Barnet.

Application for tickets should be made to Affiliation Delegate ,A. F. WEAVER ,26, Selborne Gardens, Hendon ,N.W.4